RUFUS KING.

ILLUSTRATED

Annual Register

OF

RURAL AFFAIRS,

FOR

1879-80-81.

WITH 382 ENGRAVINGS.

VOL. IX.

ALBANY, N. Y.:

LUTHER TUCKER & SON.

1881.

RURAL AFFAIRS:

A PRACTICAL AND COPIOUSLY

ILLUSTRATED REGISTER

OF

RURAL ECONOMY AND RURAL TASTE,

INCLUDING

COUNTRY DWELLINGS, IMPROVING AND PLANTING GROUNDS,
FRUITS AND FLOWERS, DOMESTIC ANIMALS,

AND ALL

FARM AND GARDEN PROCESSES.

By J. J. THOMAS,

AUTHOR OF THE "AMERICAN FRUIT CULTURIST," AND "FARM IMPLEMENTS,"
ASSOCIATE EDITOR OF THE "CULTIVATOR & COUNTRY GENTLEMAN."

VOL. IX.

THREE HUNDRED AND EIGHTY-TWO ENGRAVINGS.

ALBANY, N. Y.
LUTHER TUCKER & SON, 395 BROADWAY.
1881.

PUBLISHERS' ADVERTISEMENT.

The present is the Ninth Volume of a series originally prepared in annual parts, and subsequently published triennially in the form now before the reader. During the twenty-seven years thus embraced in its history, it has been continuously under the same editorial management; and its contents, indeed, are chiefly from the pen, and its illustrations chiefly from the pencil, of Mr. THOMAS. The principal object, from the outset, has been to compress into the smallest compass the largest amount of information of practical value to the seeker for light on any topic directly associated with Rural Industry and Rural Life; and by the aid of profuse illustrations to assist the student and elucidate the text, as well as to add to the attractiveness of the work to the general reader.

In the prosecution of this object the circle of rural pursuits has been traversed with at least a tolerable measure of completeness. Few crops or processes in Agriculture and Horticulture have escaped attention. Numerous designs for Farm and Country Houses, Working-Men's Cottages, Barns and other Outbuildings, have been given. The Implements and Live Stock of the Farm, Dairying, Bee Keeping and Poultry, have had some space; while chapters have also appeared relating to the general principles of architecture,—vegetable physiology,—fences, gates and other structures,—entomology,—fruits, flowers, shrubbery, &c.,—domestic economy, ventilation, lightning rods, and minor topics too numerous for mention, so that the index will enable the inquirer to find answers to a very large proportion of the questions likely to arise in the management and adornment of a farm or country residence. The nine volumes comprise upwards of *Three Thousand Pages*, and more than *Thirty-Nine Hundred Engravings*. In the following pages we give a brief abstract of some of the leading chapters in the preceding volumes.

It would be quite possible of course to continue the work indefinitely, but in view of the fact that it is already so comprehensive, without having reached a bulk beyond the ready purchase of any rural householder, or the accommodation of the most modest bookshelves, it has been decided that this volume should conclude the series. In announcing the decision, which, although now reached not without reluctance, had be-

come only a question of time, we think the editor may fairly be congratulated, both upon the success with which his task has been performed, and on the somewhat unusual period during which it has continued.

The volumes of RURAL AFFAIRS are sold separately, or in sets, as desired. They are especially commended to the attention of Agricultural and Horticultural Societies as attractive additions to their Premium Lists—being equally appropriate as an award in all the different departments in which prizes are usually given. Terms to Societies on application.

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THE

ILLUSTRATED ANNUAL REGISTER

OF

RURAL AFFAIRS.

IMPROVING PUBLIC ROADS.

ONE OF THE ESSENTIAL ELEMENTS of civilization consists in excellent public roads. They are a financial, moral and religious blessing. Proximity to market and to mechanics' shops is quite important to successful farming, and nearness to the post-office is a matter of great convenience in maintaining intercourse with the rest of the world. To the occupant of the farm who goes on business to the neighboring village, three miles distant, twice a week—one hundred times in the year—it makes some difference whether he passes these six hundred miles freely over a smooth, hard road, or through mud and ruts a foot deep, and over stones and other obstructions. Good roads facilitate attendance on lectures and places for religious worship; they favor in many ways the dissemination of literary and scientific knowledge, and thus become important educators to the community. In short, if we were called upon to name some distinguishing characteristic to mark a civilized from a rude and barbarous people, we should undoubtedly at once point to the excel-

lent roads of the first, and the wretched roads of the latter. So, likewise, if we should see in one portion of our Union the people blessed with fine smooth roads, and in another should find them in a state of neglect, we should unhesitatingly affirm that the former had reached refined civilization, and that the latter must be a good deal mixed up with barbarism.

One of the chief objects in these remarks is to show the value and importance of converting our public roads into pleasant and shady avenues, but before reaching this ornamental department of the subject, it may be well to examine some of the modes by which they may be made substantially useful by giving them a hard, smooth surface. The easiest and cheapest mode of effecting improvement of this kind, is by removal of stones from the track. A single loose stone, which might be thrown out in two seconds, is often struck by passing wagon wheels fifty times in a day, or more than ten thousand times in a year. What would be the effect of ten thousand blows as hard from a sledge-hammer on a single wagon? The solitary stone does no less damage, even if its blows are divided among a hundred vehicles. No outlay would pay a higher rate of profit than a few dollars applied in every neighborhood, in clearing the public roads of loose and fixed stones. If a single obstruction of this kind, by striking the passing wheels ten thousand times, costs the community who owns them no less than fifty dollars, and could be removed with half a minute of labor, which is only one-thousandth part of a day, then the fifty dollars would be saved by the appropriation of only two mills of money, affording a profit of many thousand per cent. A moment's reflection ought to induce every one who has charge of a single district of our public roads, to keep them entirely free, at all times, of every obstruction in the shape of stones.

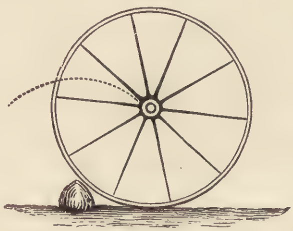

Fig. 2.—*Wheel Striking Obstruction.*

In fig. 2 the dotted line shows how high the load must be lifted in order that the wheel may surmount the stone beneath it, giving a formidable blow to the whole wagon and its load.

Fig. 3.—*Surface of Road*—a a a, *low points for drain discharge—level shown by dotted line.*

There is another way by which the highways might be greatly improved, although at a greater expense than that already described. It is by *tile draining.* Several weeks every spring witness the passage of wagons and

carriages plowing through mud and ruts six inches, or even a foot, in depth along some of our public highways. This evil would be greatly diminished by extending a tile drain lengthwise under the centre of the carriage track.

An opening or side branch should be made at the bottom of every depression to carry off the water into the ditches at the roadside (fig. 3). The drain might be partly or wholly filled with gravel. The best mode would be to cover the pipe tile first with small stone, then coarse gravel, and lastly with fine gravel or earth (fig. 4). Two or more parallel drains would give a more perfect drainage.

What is specially needed is a little reflection. Men seem to act without thinking. We sometimes see large quantities of gravel drawn and deposited at much expense in the soft mud of the road-bed, where the passing vehicles work it into mortar, simply because no adequate drainage has been provided. A free escape for the water below would prevent this waste of labor, and give a hard and dry foundation, with a smooth and compact surface above.

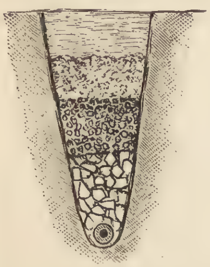

Fig. 4.—*Cross-section of Drain —stones, coarse gravel, fine gravel, earth.*

But we should by no means stop at securing a good hard surface for the easy passage of wagons and carriages. Many of our people appear to regard the public roads as something more than mere conveniences for driving vehicles. They show these thoroughfares great respect by studiously placing their residences so as to face them squarely, in preference to facing a beautiful view in some other direction. But a most singularly contradictory course is at the same time adopted. For while they most respectfully stand facing the road, as to an object of deference, they express their utmost contempt for it by emptying into it all the refuse matter from their premises whenever a house-cleaning occurs, or rubbish is to be discharged from their yards or gardens. It is quite common in certain portions of the country to see broken bricks, plaster from walls, straw from beds, weeds from gardens, brush from orchards, chips from the wood-house, and decayed vegetables from the cellar, all strewn along the borders of the public passage, or heaped in its centre. Some untidy farmers, to save land, make a barnyard of the highway, and in the absence of a sufficient tool-house, scatter along in front of their barns the various implements which they use on the farm, or cast off as useless when broken or done with, such as harrows, plows, wheelbarrows, rollers, boxes, barrels, boards and wagon racks, in variously broken and decayed conditions.

Now, instead of these defacing objects, we should endeavor to make beautiful landscape gardens of our public thoroughfares. It would be the

cheapest of all kinds of ornamental planting, for the owners would have to pay nothing for the land; and each could enjoy not only his own portion opposite to his farm, but also, as one beautiful whole, all the portions planted by his neighbors, as he passed along them. All that would be necessary in carrying out this admirable design, would be to smooth the surface and plant the trees, and avoid defacing the view with rubbish. Let this rubbish go into the brush or compost heap, where it properly belongs. Keep the roadsides clear of noxious weeds, which cost many times more than the labor of extirpating them, in the scattering of their abundant seeds to the adjacent fields. Mow the grass at least twice in the season for hay, although more frequent mowing, if it can be done with horses, will give the roadsides a more finished appearance, and cost but little. Trees should be planted along the borders of the track so as to give ample space for a sidewalk. They are often planted too near together, and crowd and distort each other as they become older. In order to afford sufficient shade, and at the same time admit free circulation of air between them, they should be planted about three rods apart where in single lines for common streets. In wide avenues they may be occasionally set in small oblong groups (fig. 5). But even here, especial care should be exercised that they may have ample room to develop their forms.

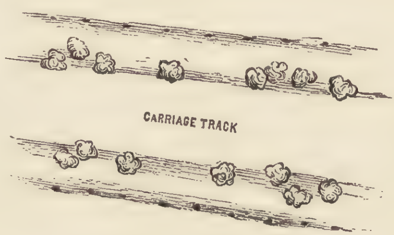

Fig. 5.—*Tree-planting in Avenues.*

The vignette at the head of this article represents a mode adopted in some places, of planting trees between the wagon track and the sidewalk, which presents a very pleasing appearance.

There are two modes of planting streets and highways; one is to place one sort in a continual row in one street, and another sort for another street, and so on. For instance, Washington street may be planted with oaks, Jefferson street with maples, Franklin street with elms, Clinton street with the ash, and so on. This mode has a pleasing effect for villages and the suburbs of larger towns. In the open country such continued lines of one sort would prove monotonous, and it would be well therefore to give short portions, or a tenth of a mile, to each sort, or alternate them individually, in which case a pleasing as well as scientific effect would be produced by intermingling the different species of the same genus, as for example, the sugar maple, black maple and red maple; the white, red and scarlet oaks; as well as the single species of the chestnut, black walnut, white elm, &c.,—see cut, top of next page. In bleak and windy points, place screens of Norway spruce and other evergreens near enough together to shut off the

Elm.

Maple.

Oak.

wind and snow drifts when they have grown ten or twelve years (fig. 7.) These screens may be easily cut back with a knife, and the trees prevented from attaining full size. and be made to grow more compactly. It may

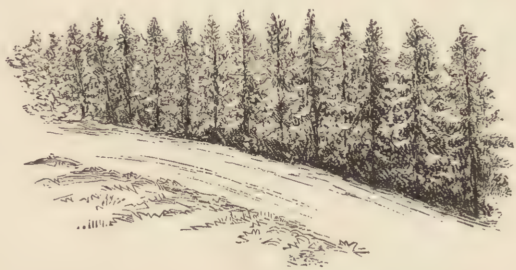

Fig. 7.—*Evergreen Screens at Windy Places in Roads.*

not be out of place here to remark that if the owners and managers of railroads should plant such cheap screens along the most windy portions of their lines, it would save much expense in shovelling snow, erecting costly board barriers, and perhaps occasionally prevent destructive collisions.

It is, of course, necessary, in making public roads neat, smooth and ornamental, to exclude cattle and other domestic animals. A great improvement has been made in some of the States in this respect of late years. The cattle law of New-York has been a great public and private blessing. When cattle had the range of the streets, where they obtained a very scanty living, they were driven by starvation to acquire all the arts of opening gates, or breaking or leaping fences. No garden or cornfield was safe. The cost of the extra fencing required to exclude them would more than have paid for good pasturage. The loss of the crops in gardens was still greater in amount. In many places it was ascertained by careful estimate that the extent of scanty pasturage afforded by the roadsides was not more than one-tenth of the feed actually required to sustain the animals that thronged them. Most of their feed was of necessity obtained by plunder.

When the new law was enacted, some of the owners of street cattle declared they would not regard it. The history of the way in which the law was enforced and sustained affords some interesting incidents. An extensive farmer in the western part of this State was told by some of his neighbors that they should still continue to pasture their cows in the streets. He had a fine thirty-acre wheat field just coming into head. He removed all the fences between this field and the highway. The cattle owners knew they would have to pay heavy damages if they turned them in the streets, and the practice was broken up. In other places the owners of fine gardens threw their gates wide open, and announced that they would remain open night and day. No one dared to run the risk of paying for the damages; or if in any case formidable mischief was done, this only served the more speedily to entrench the law in all its strength, and it still remains in the full force of its civilizing majesty.

We have reached a great point in thus securing our public thoroughfares from the intrusions and defacements of these lawless intruders. Let us now aim with all our energy to make them objects of landscape attraction, by the exclusion of all defacing materials, and by planting beautiful shade trees. If this were carried out generally, what would be the result? A summer-evening ride would be an occasion of real delight; an evening walk would be a promenade through a handsome landscape garden; smooth and hard roads would bring farmers nearer "to mill, to market and to meeting;" purchasers of farms would seek such pleasing neighborhoods, and land would sell at higher prices; education and refinement, in connection with the increase in the attractions of home, would give a higher position to life in the country, and young men would prefer a refined agricultural home to one of turmoil and anxiety in towns and cities.

Singular Extravagance.—S. B. Parsons remarks in the Rural New-Yorker, that he knows a gentleman of refined horticultural taste, who planted a beautiful landscape garden, containing some very rare trees, for which he had to pay $25. But this is not the "extravagance" we allude to. His friends from the city come to see his grounds, and when they find young trees which cost so much, look on him as if he were half crazy—and then go to the city and buy a piece of furniture costing $500, that would be truly beautiful and useful at fifty. We know a man who erected a $20,000 house, when one at $15,000 would have been quite as good, but who could not expend $50 to plant the grounds, which would have made more show than $5,000 in his house.

Fertile and Sterile Flowers.—English gardeners find a great difference in the perishable character of flowers when fertilized with pollen, or excluded from it. One of the orchids will remain in good condition a month or six weeks if not fertilized; but operated on by pollen, the flowers fade in a day or two, and the seed-pods elongate rapidly. Hence they find it important to exclude bees from pelargoniums to prevent the petals dropping.

CONSTRUCTING LIGHTNING RODS.

THE FIRST QUESTION which the owner of an unprotected building asks, on being advised to put up a lightning-rod, is: "Will it really afford protection, or is it a sham?" A correct answer would be: If properly made, it will give ample protection; if badly constructed, it may do little or no good, or positive harm. In proof of the utility of good rods, some striking cases may be cited. The following are mentioned in Phin's excellent little work on this subject: The monument in London, which is over 200 feet high, and has stood two centuries, has never been struck by lightning, which has often fallen on the lower buildings around it. The metal connections which unite the different parts of the monument, afford a free passage for the electric fluid to the moist earth below; the other buildings have no such connections. A church in Carinthia, standing on a hill, was struck on an average five times a year, and in one instance several times a day. It was deemed unsafe to celebrate service within its walls. A lightning-rod was then placed upon it, after which it was struck but once in five years, and in this instance no harm was done, the stroke falling on the metallic point without damage. The church of St. Michael, in Charlestown, was frequently damaged by lightning, but after the erection of a rod it had escaped for fourteen years. St. Mark's steeple in Venice, 340 feet high, was often struck until protected by a rod, after which it escaped. The celebrated Strasbourg cathedral was struck three times within a quarter of an hour in 1833, causing damages which required millions to repair. In 1835 lightning conductors were erected, since which no harm has occurred.

The cathedral at Geneva, the most conspicuous and highest in the city, has entirely escaped for centuries, while another tower much lower has been frequently injured. The great central tower of the cathedral is built of wood, but covered with metallic plates, which are connected with the roof of metal, and this, through the rain pipes, with iron drain pipes imbedded in the earth. During the sixteen years prior to 1816, no less than 156 vessels of the British navy were struck by lightning, 73 men were killed and 183 injured; while the loss in property amounted to over a million dollars. But since the adoption of the efficient system of conductors devised by Sir W. Snow Harris, the losses and damages have almost totally ceased, notwithstanding the greatly increased number of vessels.

Many buildings however have been struck with lightning, although furnished with rods, and in some cases destructive conflagrations have been the consequence; but in all these instances, where an examination has been made, obvious and glaring defects have been discovered in their construction. It has been estimated that more than half the lightning rods now in use throughout the United States are of little or no value,

and some may be even positively detrimental; probably not one in ten proves as safe and efficient as it might easily be made. It is the object of this article to point out the common defects, and show how to avoid them, as well as how to erect a perfect protector. To put up a rod understandingly it is necessary to know something of the nature of electricity, in relation to which there are perhaps more mistakes committed than with any other science.

Leading Principles.

Dr. Franklin, who first proved the identity of lightning with common machine electricity, supposed it to be a very subtile fluid, possessing great force, but no weight, which pervaded the whole earth and all bodies at its surface. Unless disturbed by unusual influences, these bodies were supposed to have alike a natural quantity. But if this equilibrium were disturbed, and any of them were made to contain more, or to have less than the natural quantity, they were *electrified.*

Those substances which allow the electricity to pass freely through them, or which offer but slight resistance to its passage, are termed *conductors;* others, which resist the passage, are *non-conductors.* The metals are the best conductors; glass and the resins are among the non-conductors. Water, and all substances containing it in a free state, such as moist earth, green wood, and flesh, are moderate conductors

When two non-conductors are rubbed briskly together, one of them takes the electricity from the other, and according to Franklin's theory, becomes positively electrified; while the other, thus losing a part, is negatively electrified. The one has more than its natural share, the other less.


Fig. 8.

The accompanying diagram (fig. 8) may represent two such bodies, the dark portion indicating the accumulated or positive electricity in one, and the white part the negative condition of the other; the shaded portions are the natural condition where no disturbance has taken place. Both will show their electric condition by attracting small, light substances, as feathers, bits of paper, &c. If conducting bodies are rubbed together, they will exhibit no signs of electricity, because as fast as one takes it from the other, it is instantaneously restored by their conducting power.

It is now generally believed that electricity is not really a separate fluid, as supposed by Franklin, but merely a property of matter, like attraction and sound. The waves on a lake or sea are only conditions of the water; and the sounds which strike the ear are only waves in the air. If, therefore, we look upon electricity as merely a *force* and not a fluid, we may adopt the theory of Franklin, with this modification, and apply it to all ordinary phenomena.

An electric machine is made by causing a conductor and a non-conductor to rub together—the latter a revolving glass plate or cylinder. The rubber or conducting substance supplies the glass with the electricity, which

thus becomes positively electric, and this electricity is then taken off by metallic points from its surface as it revolves, and fills a conducting cylinder on the opposite side of the machine, the escape of the electricity from which, is prevented by its being supported on a glass leg or non-conductor. If the knuckle, or any other conducting substance, is now brought near this insulated and electrified cylinder, a spark flies through the air with a crackling noise between the cylinder and the knuckle. This is lightning on a very small scale; and the same properties and

Fig. 9.—*Silent Discharge by a Point.*

influences govern one as the other, and we can thus study the principles of the science on a table before us, more safely and conveniently than with lightning-rods on a larger scale out of doors with the accompanying danger.

Among the properties thus discovered is the important one that a sharp metallic point will draw off the electric charge from a conductor silently and without the crackling spark, (fig. 9.) A round ball or knob, on the contrary, causes an instantaneous discharge, with a noise like an explosion, (fig. 10.) This principle has been applied in giving sharp points to the upper ends of lightning-rods, for drawing off the lightning from the clouds or vapor above, without the violent explosion which would otherwise take place.

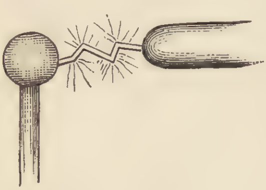

Fig. 10.—*Electric Spark.*

Induction.

This is one of the most important principles in the science, and should be well understood. It is founded on the fact that bodies charged with the same kind of electricity repel each other; but are attracted when it is unlike. When a highly charged conducting body is brought near enough for a spark to pass, the charged body drives the electricity out of the other, or to its further side. Suppose, by way of illustration, that *N*, fig. 4, represents a metallic ball, insulated on a glass leg. *P* is another similar ball, also insulated, and connected with the electric machine. The electricity from the machine accumulates in *P*, and this repels the fluid from *P N*, (which is too far off for a spark to pass,) and drives it away from the side *N* to *P*. This accumulation in the middle

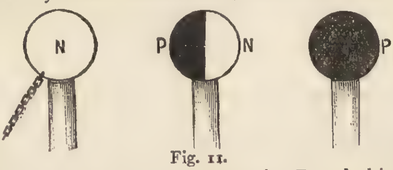

Fig. 11.

ball to the side towards the ball *N* tends to drive the electricity from *N*, which will escape through the chain, and leave *N* negatively electrified, although nothing has actually passed between them. By using a hundred or a thousand insulated balls, the first may be thus made to control the last at an indefinite distance. This influence, without the passage of the electric fluid, is termed *induction*.

When a spark is drawn from the electric machine, we may suppose that it merely represents the discharge between an electrified body and one in the natural state. But where it passes between two bodies, the one strongly positive and the other strongly negative, the spark is shorter, louder and more brilliant. This is exhibited by the Leyden jar, (fig. 12,) which has its inner and outer surfaces coated with tin-foil, except near the top. A ball and chain supported by the cork connects with the inner coating, and as the glass sides of the jar prevent it from passing through them, the inside may be strongly charged. This repels by induction the electricity from the outside, which becomes strongly negative. When a nearer connection is made between them, a quick and violent discharge takes place, which, if it passes through the human body, produces the *electric shock*. If the glass jar is quite thin and is heavily charged, the discharge sometimes takes place through the glass, the hole thus bored being filled with the pulverized glass.

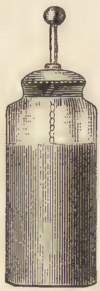

Fig. 12.
Leyden Jar.

Sharp, quick flashes of lightning are like the spark of the Leyden jar. A cloud overhead, when strongly charged with electricity, tends to drive away a part of the natural electricity of the earth below, and that portion of the surface becomes negative. A discharge in the form of lightning is sharp and violent between them, for the same reason that the spark from the Leyden jar is sharper than a simple spark from the electric machine. Hence the reason that low clouds often produce more frequent and dangerous crashes than the more common and less violent lightning high in the clouds above.

Electricity of the Clouds.

The clouds—the moisture of which makes them partial conductors—are nearly always more or less charged with positive electricity. In ten thousand observations made at Kew, about one in three hundred, on an average, showed negative electricity. When the clouds are strongly positive, the tendency is to produce the common appearances of lightning with thunder, the discharge moving downwards. When negative, the lightning may strike upwards—an instance of which occurred within the knowledge of the writer, where mud was thrown from the earth against the window and eaves of a dwelling, accompanied with a loud report, the sill-board being perforated and torn, and the pieces thrown upwards. The negative state of the clouds is usually more feeble than the positive, and the noise is not

so violent. In several cases those discharges have been nearly silent. A gentleman on horseback, on a damp and dark night, saw a brush of light on the tips of his horse's ears, the electricity slowly escaping from the earth to the damp negative air above In another case, an ignorant laborer, returning at dark from the hayfield, saw similar brushes of light on the tips of the pitchfork on his shoulder, and being superstitious, he dropped it in terror and fled, (fig. 13.)

Fig. 13.—*Frightened by Electricity.*

Clouds charged with electricity are often two or three miles high, or even more; and when this is the case, the lightning rarely or never strikes the earth or the objects at its surface, but the discharges are from one cloud to another. Sometimes, however, their lowest surfaces may be within half a mile or less. When very near the earth, there is greater danger to buildings, trees and animals. There is no doubt that the moisture in apparently clear air may sometimes contain much electricity, but less than dense clouds.

Buildings and trees, although they are imperfect conductors, may be sufficiently so to invite the discharges of lightning in their downward course, but not enough to afford a perfect passage, and hence they may be torn or shivered to pieces, or set on fire. The object of lightning rods is to provide a safe and complete passage for the discharge by using metal, which is thousands of times a better conductor than moist wood, stone or brick.

The intensity of the discharge may be increased, when a strongly charged positive cloud is overhead, by the process of induction already described, rendering buildings and other objects negative, through the repelling influence of the electricity above, and the lightning will be sharper in its restoration of a state of equilibrium between those two opposite states.

The flash of lightning is instantaneous, but thunder usually continues for some seconds, and often half a minute. This results from the comparatively slow progress of sound, four and a half seconds being required for it to travel a mile; and when the flash is several miles in length, the sound is a half minute or more in coming from the more remote portions of the flash. The distance of a thunderstorm from the spectator may be nearly determined by counting the seconds between the flash and the thunder, and allowing about four and a half seconds to the mile, or thirteen miles for a minute. In the accompanying cut,

(fig. 14,) that part of the flash at *b*, if two miles distant, will be heard by the spectator more than four seconds after the part at *a*, only a mile off,

Fig. 14.

and still more time will be required for the sound to come from *c*, while there will be a continued roll of thunder between.

The Importance of Artificial Protection.

A large number of persons are killed every year by lightning. Statistics give the average number of deaths at 22 in England, 75 in France, and 40 or more in the United States. No less than 2,250 were killed in France in a period of 30 years, and a larger number more or less injured. This was an average of one death annually in half a million, which, although small compared with the whole population, is large enough to induce every precaution for safety. In 1807 the powder magazine in Luxembourg, containing 14 tons, was struck, and thirty persons killed by the explosion. Spang says that in the thunderstorms in August 1872, in in New-York and New-England, over 200 dwellings were struck, and ten persons killed. Telegraph wires were melted by the half mile, and poles shattered in all directions. This, however, was an extraordinary season.

Essentials of a Lightning Rod.

Having explained the leading principles of electricity, there will be no difficulty in understanding what the lightning rod must do, and what essentials are required for its successful operation. Being made of iron or copper, it will conduct the electric current many thousand times better than the common materials of which houses and barns are built, and the current will take this metallic course in preference to the building. If the rod is high enough above the building, so that any discharge may find it before reaching the building, it will be carried safely downwards, provided there is no break or interruption in the rod, and provided it reaches a permanent conductor at the bottom, to convey the discharge into the earth. These then are the three essential parts: 1. Height above the building;

2. Continuity throughout; 3. Connection at the bottom with permanently moist earth or water.

1. If the rod is not high enough, there will be danger that the lightning may strike the chimney, the soot of which is a conductor, or it may strike other elevated portions. As a general rule, the top of the rod should be at least as much above the roof as half the length of the roof from the the rod. In other words, a rod will commonly protect a horizontal space, the diameter of which is four times as great as the height of the rod above it, if the rod stands in the middle; or twice as great, if the rod is at one end. There may be some possible exceptions where this rule will not apply, as in a case shown by Phin, where the clouds are represented as driven towards the end of a building away from the rod. But such danger must be of rare occurrence, especially if the rod extends well above the roof, or one is placed at each end.

In fig. 15 the rod is attached to a chimney nearly at the centre of the

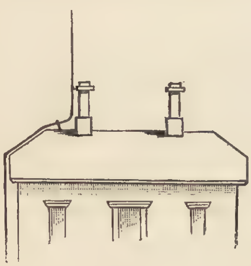

Fig. 15.

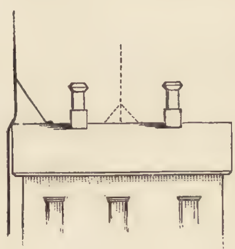

Fig. 16.

roof, in which case it must be half as high as the distance between the the chimney and the farther end of the building. Sometimes it may be more convenient to place the rod at one end, (fig. 16,) a more direct connection being thus obtained with the earth. In this case the rod must be twice as high as when placed at the centre, where the dotted lines indicate the diminished height. Probably a still better way would be to place a rod at each end, and secure a direct communication with the earth at both ends. Or, if the two are well connected by a metal bar on the roof, this arrangement will be nearly as good.

2. The importance of a continuous rod is self-evident; for if made up of several parts or sections, and one is displaced, the rod would do more harm than good, by inviting the discharge without conveying it from the building.

3. For the same reason, a sufficient earth terminal is absolutely essential, to convey the discharge away from the building. If defective in this particular, no rod, however perfect in all other respects, can be of any use, but would be a source of danger. Nearly all the cases of failure in con-

ductors are doubtless from this cause. They afford a partial passage for the discharge, or convey it into the building. In this way buildings have been crushed, torn, and set on fire by the lightning, and water and gas pipes torn up and melted at the joints.

Water and moist earth are conductors, while perfectly dry earth has scarcely any conducting power at all. The rod must therefore penetrate the ground deep enough to reach permanently moist earth. In most localities a depth of six or eight feet will be enough, if branching in various directions at the bottom, so as to dissipate the electric discharge.

Details in Construction.

Nearly all the houses and barns erected in the country have shingle roofs; a few have slate; rarely a roof is seen of tin or galvanized iron. Most of the directions here given apply therefore to roofs made of wood.

The best material for the rod, all things considered, is iron. Copper is a better conductor, but is more expensive, and for the same cost is not equally stiff in its position. A round iron rod one-half or five-eighths of an inch in diameter is commonly large enough, although three-fourths of an inch is safer. The advantages of a larger rod are that it will be more certain to carry off all the discharge. If a good conductor is small, a part of the electric current seeks additional channels, even in poorer conductors, and the danger is increased of passing down through the walls of the building. No discharge was ever known however to melt a half-inch rod.

For most buildings it is best to weld the different pieces together, which makes the rod stiffer, and less liable to become separated into parts than if simply screwed together, or connected by staples or links. Any owner of a building who is about to erect a rod should measure with a cord or tape-line the distance from the top of the house to the ground where the rod is to pass, and then add to its length eight or ten feet for the portion beneath the surface; and also for the height above the building one-quarter or more of the length of the roof if the rod is placed at the centre, or one-half the length if placed at one end. The pieces of rod sufficient for this length may be easily welded together by a blacksmith, and it may then be taken home by fastening the pointed end to a wagon and dragging the length on the ground. Two or three men will then erect it and place it in position on the building.

The Upward Points.

Dr. Franklin, having observed that a sharp point would silently draw off the electricity from a charged body, concluded that the upper end should be a sharp point, with a view of exhausting the charge from the clouds and preventing the instantaneous discharge of lightning. Some late writers have objected to a sharp point, thinking it insufficient to effect a silent

discharge. There is no doubt, however, that when the electricity is near the rod, and in the damp air above, the point will prevent a sudden flash, and when the cloud is higher, it would tend more or less to diminish the force of the lightning. Some years ago, a rod on a dwelling occupied by the writer, with a single point, received a terrific discharge, louder than any cannon, which melted the point into a ball the size of a small bullet, (fig. 17,) but did no other harm. There is no doubt that the rod saved the house from destruction. If instead of a single point there had been several, to divide the discharge, (fig. 18,) probably none would have been melted. It has been objected by some electricians that several points together operate precisely like a ball; but experiments with an electric battery show that this opinion is a mistaken one, a dozen or more fine wire points within a space of half an inch drawing off nearly silently a heavy charge. The best form therefore would be a terminal with several diverging points, spread out like a fan, as in fig. 18. Or they may expand in the form of a circle. These points may be easily made by welding six or eight smaller rods to the end of the main rod, sharpening the ends and then bending them in a diverging position The points are sometimes expensively tipped with silver or platinum, but this is needless, as the iron is easily hammered sharp enough for all practical purposes, and the points will remain so an age.

Fig. 17.

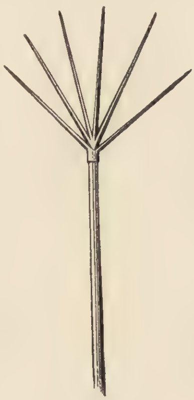

Fig. 18.

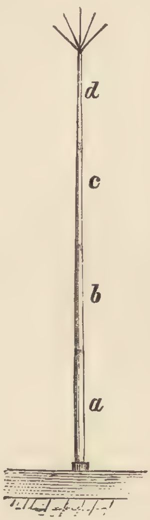

Fig. 19.

It is important for preserving the stiffness of the rod above the building, that it have a gradual taper upwards. This may be effected by making this portion of the rod of several pieces welded together, the larger, say an inch in diameter below, and the smaller about half an inch in diameter at the top, each piece before welding being about two or three feet long, as shown in fig. 19, *a*, *b*, *c*, *d*.

Supports for the Rods.

Buildings made chiefly or wholly of wood may have supports which shall hold the rod several inches off from the building, so that in case of a violent discharge, the building may be in less danger of being set on fire. Such occurrences however would be very rare, and it might be unimportant whether the rod was held off or in actual contact. To attach a rod to chimneys, a light wood frame should be fitted around them, as in figs. 20 and 21.

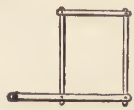

Fig. 20.—*Frame for Chimney.*

Fig. 22.—*Support for Rod.*

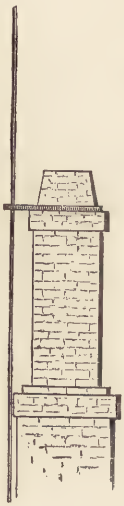

Fig. 21.

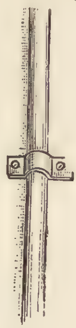

Fig. 23.

Fig. 24.

If, however, there is a metal cornice, eaves-trough or roof, it is important that there be an actual contact with the rod, that the latter may convey to the earth any portion of a lightning discharge which those metallic portions might receive.

The supports for a wooden building may be simply small pieces or blocks of plank, like fig. 22, nailed or screwed against the building. These are slipped over the lower end of the rod before it is erected, and afterwards distributed along the places required. If the building has a metal roof, eaves, or other large metal portions, the rod should be secured in close connection with these, by a metal staple screwed on, as in fig. 23.

If square or flat bars are used, instead of round rods, (and they will also answer a good purpose,) they may be screwed to the sides of the building in the same way, by means of staples and screws This mode answers

well when the building is partly made of iron, as already described. Fig. 24 represents a convenient mode of bracing rods on the roofs of barns.

Termination in the Ground.

This is a matter of vital importance, and should be well understood. A hole should be dug for the foot of the rod, deep enough to reach permanently moist earth, that will retain its moisture during the severest seasons of drouth; this in common soils is not less than seven or eight feet. If this depth cannot be reached, one method is to provide several branches to the lower end, welded or wired on, and spread in every direction. Charcoal being a good conductor, a bushel of it may be spread over the bottom of the hole before being filled with earth. Another mode is to attach a rope of copper wire to form the lower end of the rod, spreading the wires. The union between the iron and copper should be above ground, to prevent the iron from becoming oxidized by the generation of galvanic electricity.

The objection to the expanded copper rope for the earth terminal is the want of surface. To enable the imperfectly conducting earth to convey away the electric current as it comes down the powerful metallic conductor, a *broad surface* of the metal should be placed against the earth. For this reason, a large copper sheet is better than rods or wires, and is the best of all terminals.

One of the safest connections with the earth, and undoubtedly much better than any other, is to make an excavation large enough to place a sheet of copper with several square feet of surface, the lower end seven or eight feet below the ground, and connect the rod with this copper sheet—taking care, as already stated, that the union between the copper and the iron rod be above the ground where the iron is dry. If the daily drainage from the kitchen is made to run down against the side of this surface of copper, it will tend to preserve constant moisture in the earth in contact with it, and render the earth terminal absolutely safe and perfect. The great advantage which copper possesses over iron is in not rusting away when exposed to moisture. It is advisable to place the foot of the rod a few feet away from the building, where the earth receives more moisture from the clouds above than under the shelter of its walls.

Metal Roofs.

Roofs covered with tin or galvanized iron afford protection against injury by lightning, provided a good and ample connection is made with the moist earth below. Should the lightning then strike any part of such a roof, it would be instantly conveyed to the earth. As electricity does not leave a good conductor for a poor one, it would not pass to the wood, stone or brick of the building.

As a matter of additional safety, and to prevent striking the roof at all, one or more rods should extend from it to a suitable height above,

as already described. All the metallic water pipes should also be connected with ground terminals.

The common opinion that paint injures the conducting power of a rod is entirely groundless. Paint is no worse conductor than *air*, which surrounds all rods. The paint is a positive benefit by preventing rust.

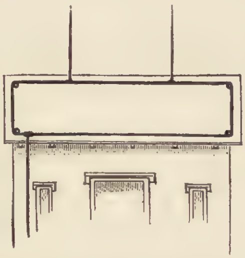

Fig. 25.—*Frame of Flat Bars connected with Rod on Roof.*

Where roofs are made of wood, and a sufficient amount of rod protection above them cannot be easily given, flat iron bars laid on them and connected together and with the rod, form a safe protection, (fig. 25.)

Common Errors.

Rods on wooden buildings extend but a short distance above the roof or chimney, which does not remove the danger of the lightning striking some other part of the building. The height should never be less than already pointed out in this article.

It is common to use iron supports for the rod, with a small glass separation between the two, (fig. 26.) Such supports are worse than useless. A small spark from the common electric machine will leap over the narrow glass surface, which could be of no possible protection against a heavy lightning discharge; and as soon as the glass becomes wet by the rain, it conducts freely. The iron supports would tend to convey the discharge into the building. Supports of wood, as already described, would be far better; and where there is a metal roof or cornice, the rod should be in direct contact with it.

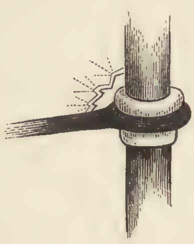

Fig 26.—*Useless Glass Support.*

Rods are sometimes made broad, thin and flat, or thin and hollow, with the supposition that the electricity passes only through the surface, and that a solid round or square rod is a needless use of metal. When at a state of rest the electricity is confined to the surface; but when passing rapidly, it enters the body of the conductor. This has been fully proved during the past year by Dr. Kedzie, in a series of carefully conducted experiments; and it has long been known that while a small wire would allow the free passage of a heavy charge from a Leyden jar, a thin piece of gold leaf with ten times the surface would be destroyed. On the whole, therefore, a round iron rod is probably as good, if not better, than any other form, although a square or flat bar may answer as well.

Imperfect ground connection is the most common cause of failure. Phin gives an account of three large buildings struck in Philadelphia,

involving a loss of two hundred and fifty thousand dollars. All had lightning rods, but none of them had good earth connections, as was afterwards found on careful examination.

Sometimes a hole is made with a common crowbar, and the foot of the rod thrust into this hole. The rod may not be in contact with the earth, or the earth may become dry so near the surface, and the rod fail to afford protection against lightning.

Employing a common lightning-rod agent or vender is one of the many errors commonly committed. Most of them, knowing little of the science, erect imperfect rods, with many needless appendages, at a cost to the owner of several times that of a good, simple rod. To make one which shall be both cheap and efficient, every owner should construct and put up his own, according to established principles.

Termination in the water of cisterns or wells is not advisable. The water will rust the rod if of iron; or become poisoned if of copper. The cistern may become dry, and then the connection would be worthless; or if the cistern is surrounded with dry earth, the escape of the discharge would be nearly prevented.

It is a common opinion that a barn full of fresh hay is more liable to be struck than other buildings, on account of the column of vapor passing upwards from the hay. It has even been asserted by high authority that an ice-house is peculiarly liable to be struck, because the evaporation from the melting ice forms a partial conductor. A little reflection will show the fallacy of these opinions. There is not so much vapor passing off from nearly dry hay as from an equal surface of moist earth over all parts of the farm; and the cold moisture in an ice-house would not furnish a larger amount of vapor than a warm surface of earth. Of the many barns which the writer of these remarks has known to be struck, more were struck early in the season, when nearly empty, than after being filled with hay.

High-priced and patented lightning-rods have been made with various points and angles, wings, corrugations and spiral coils, with the claim that the angles and points would draw the electric fluid and increase the safety, when in fact they would equally tend to discharge it from those points into the building. None of these patents are better in any respect than a simple round or square rod.

The owners of all buildings on which rods have stood many years should occasionally examine them, to see that the earth terminals have not become unsafe by rusting away.

WASTE PRODUCTS.—The Bradford (Eng.) town council has been offered $50,000 per annum for the next seven years for the refuse of the gas works. The average price received during the last ten years was $4,000. The increase is partly due to the advance in the price of sulphate of ammonia, but mainly to the aniline and other products now obtained from the "refuse" of coal distillation.

PURE WATER FOR HEALTH.

AN ARTICLE ON VENTILATION, showing the evils of impure and confined air, appeared in the ILLUSTRATED ANNUAL REGISTER for 1877. As the deleterious effects of the use of impure water are not less formidable, they should be well understood and guarded against by the whole people, whether they occupy city or country dwellings. As George Geddes justly remarks, when speaking on this subject: "There are families who live on farms and who fancy they are drinking the best of water, while in fact they are constantly imbibing poison, that sooner or later will appear perhaps in the dreaded form of diphtheria or typhoid fever." There are thousands of the members of the families of farmers in this country who perish annually in consequence of the impurities which are permitted around their doors and in their houses.

It has long been known by scientific men that good drainage and pure water are essential to health. As long ago as 1834, a leading physician of London gave his evidence that *four-fifths* of the cases of typhus or typhoid fever were caused by foul drains or streams.

DISEASE FROM IMPURE WATER.

A distinct and striking proof of the poisonous effects of polluted water was given by Dr. T. H. Bailey, in the Sanitarian for June, 1875. A hotel at Lake Mahopac, fifty miles north of New-York City, capable of holding five hundred guests, was proved to be healthy, scarcely a case of sickness occurring during its first years. In enlarging the water reservoirs, an old cistern fell into disuse; slops from the kitchen found their way into it, and a portion became mingled with the pure drinking water of the other cistern. As a consequence, there were cases of cholera morbus and typhoid fever at the hotel. The cistern was cleaned, and the sickness ceased. This was in 1871. It was kept clean in 1872, and there was no sickness. In 1873 it was again neglected, and typhoid fever recommenced. The cistern was again cleaned, and health was the result A new landlord came, who was a stranger to the place. On the 1st of July there were five hundred people there. In two weeks disease broke out worse than ever, over one hundred were sick, twenty-five had fever, and five died. On examination the cause was found; the old cistern was torn out, the pipes were cut, and the vacancy filled with fresh earth. Since that time the hotel has been as healthy as ever. Impure water caused all the sickness and death, and kitchen slops polluted it.

Careful statistics were procured many years ago, when at different times the cholera broke out in London.* In 1849, over 14,000 died; in 1854 there were over 10,000 fatal cases; in 1866 the deaths amounted to about

* Some of these facts are quoted from Prof. Brewer's paper on this subject.

6,000, or less than half the number 17 years before. Long and full investigations were made, and it was demonstrated that in every instance after the disease was first introduced, it was spread through drinking water. But the question will occur, why did the disease diminish in each successive year of the malady? It is easily answered. There were many water companies supplying the city, and among them two that pumped the water from the river. Of 167,000 persons supplied by the lower company, one died in 80; of the 268,000 supplied by the upper company, one died in 85—the water becoming more polluted from sewers as it passed through the city. The lower company then changed its source of supply some miles further up the stream, and when the disease again appeared, only one died in 270.

Laws were then passed (after its second appearance) compelling the adoption of methods for purifying the water, and twelve years elapsed before the disease again made its appearance, when the number of deaths was but little more than one-half. Most of these deaths occurred in the lower portion of the city, where they were seven times as great to the population as elsewhere. An investigation was made by the British government, and it was found that one company had supplied the people with water which had not been purified as required by law, and the crime of this omission cost thousands of lives.

A case of special interest was connected with the "Broad-street pump." Its water was so clear and sparkling as to be unusually popular, and it was largely used in the neighborhood. Yet without any apparent change in the water, over 500 persons who used it died of cholera. "On careful investigation it was found that the dejections of an early cholera patient had been thrown into a cess-pool near the well, and the underground track was found, along which water percolated into the well, but not enough to disturb its transparency or taste, but enough to cause hundreds of victims."—(*Prof. Brewer.*)

A vast amount of evidence has accumulated of late years, both in Europe and America, showing that thousands of fatal cases of sickness have occurred from drinking impure water, rendered so by underground leaks from the vaults of closets. Dr. Pinkham of Lynn, in his report on the sanitary condition of that city, containing over 30,000 people, made to the Massachusetts Board of Health, says that "the most erroneous ideas in regard to the liability of wells to contamination prevail among the people. Persons of high intelligence on most points, feel perfectly secure in regard to their wells, with a cess-pool within a few feet of them." He gives illustrations of several, showing the manner in which wells are contaminated by them, one of which we copy, (fig. 27.) As a consequence, five cases of typhoid fever occurred in 1875 in the family living in one of the houses, and seven more, with one death, among other persons using the water. An analysis of the water showed it to be highly contaminated. In another case a well ten feet distant from a vault, where the

premises were kept clean, and containing water that was clear and of good taste, received impurities from the vault, and caused five typhoid

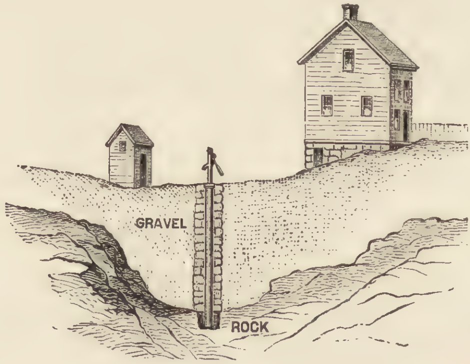

Fig. 27.—*Well Contaminated by Vault.*

cases in one family, and several others and one death, among neighbors who used the water. It was analyzed and found to contain objectionable matter.

It may be thought that such formidable sources of disease, which prevail in cities, do not affect the country, and that farmers need not trouble themselves about them. But it must be remembered that much greater care is taken in cities to secure systematic efforts for prevention, and that the various epidemics, as typhoid fever, diphtheria, and other diseases increased by a want of cleanliness and drainage, prevail frequently and fatally all through the country, and that thousands are carried off annually by these maladies away from large towns. Typhoid fever is more frequent in the country and in villages than in cities. There is less excuse for a want of care on the part of country residents, seeing that they have the space to effect a thorough removal of all impurities.

Filtration through the Earth.

Vaults and other receptacles for impurities, if newly dug in the earth, retain for a time all the contents within their bounds. But gradually the earth absorbs these substances, and as it becomes saturated they extend further, and frequently small crevices or channels between the layers of soil convey the contents to long distances. If the earth is compact clay, the process is slow; if loose gravel, sand, or rocks with seams, it is more rapid.

It is well known to farmers that water will flow through the soil horizontally, far enough to bring the water of the soil into drains when they are two or three rods or even more apart, (fig. 28.) If therefore the water

from impure sources is within a rod of the well, (which is deeper than a

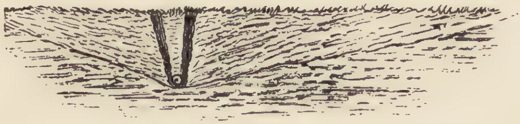

Fig. 28.—*Water Drained Horizontally Long Distances.*

drain and will extend its drainage further,) the water will freely flow towards it, and pass into it, (fig. 29.) For a time the soil may absorb the impurities, but when it becomes saturated there is nothing to prevent the

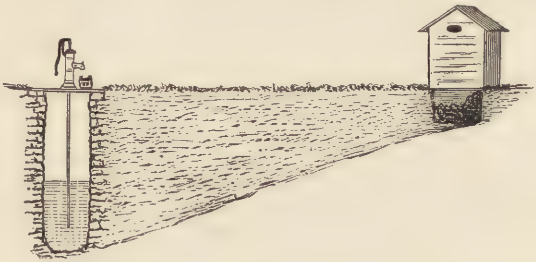

Fig. 29.—*Well-water Polluted by Vault.*

water of the well from becoming heavily contaminated. Instances are recorded where water from the sink spout has flowed forty feet through soil and polluted the water of wells.

It may happen that while all the family remain in health, the impurities from vaults may not produce positive sickness; but if any one happens to be attacked with the epidemic, those impurities will then become a deadly poison. In this way whole families are sometimes prostrated, and the disease, which spreads only through the poisonous influence of the bad water, is supposed to be contagious, and wrong means for prevention are resorted to.

Dr. H. O. Hitchcock of Kalamazoo, Mich., who has given much attention to the subject, insists that no vault without a cemented bottom and sides should be allowed within four rods of a well supplying human beings with water for drinking and culinary purposes. He adds that "in the villages and cities of Michigan, and even in the country, there are hundreds and thousands with deep, uncemented and full vaults, within twenty or thirty feet of wells, the sources of water for hundreds and thousands of families. No wonder that statistics record so many deaths from zymotic and low diseases of a typhoid type."

Where the soil is gravelly and porous, and rests on an impervious hard-pan, or has horizontal seams and fissures, even so great a distance as four rods, would be insufficient, and it is hard to say under such circumstances

what the distance should be. The French government, in the early part of the present century, forbade digging wells within twenty rods of cemeteries, and ordered those to be filled which were nearer.

The Michigan Health Reports furnish a large number of instances where typhoid fever was brought on by the pollution of the water of wells from barnyards, and in such cases the disease was arrested, or new cases prevented, by the discontinuance of its use. In one instance typhoid occurred in a family that used water from a "driven well" thirty feet deep, and sixty feet from barn and vault, the soil being porous sand and gravel, and the ground sloping towards the well. Such wells afford strong protection against surface water, but in this case it settled down outside the pipe and entered below.

An extraordinary instance of the conveyance of disease to a distance of one mile, partly in a stream of water, and partly by the water soaking through porous soil, occurred in 1872, in the village of Lausen, in Switzerland. The village contained over 700 inhabitants in ninety houses. A mile distant was an isolated house in which a man was taken sick of typhoid fever, which was supposed to have been imported. The village had had no disease of the kind since its occupation by soldiers in 1814. Yet, although there was no communication between the isolated house, a mile distant, and the village, there was an outbreak of the disease, and one hundred and thirty cases of the sickness occurred, of which eight proved fatal. On a careful investigation it was found that a small stream of water near the isolated house had been polluted from the sick room, and this stream, used for irrigation, had carried the impurities to a public well, from which nearly all the inhabitants were supplied. There were six houses which had wells of their own, and their occupants did not use water from the public well; they remained in health except two, who had, when from home, used the public water. Every one of the one hundred and thirty who became sick drank of the water from the public well. There had been no communication between the isolated house and the village, and the disease was not conveyed by contagion, but was wholly the result of the use of poisoned water.

Absorbents for Vaults.

In the country, and away from cities, there are some very important advantages gained by the use of dry absorbents in vaults. If kept dry till used, and they are employed in sufficient quantity, they wholly prevent any possible drainage to wells or other sources for water supply. No liquid portions can escape from them. In this respect they possess a most important advantage over water-closets, the discharge from which must be always taken away by water, for which an escape must be secured. The dry absorbents, on the contrary, obviate the necessity of any care of the kind, and if constantly attended to, are accompanied with no odor, and the contents of the vaults are as easily shoveled out and drawn to land to be used as a

fertilizer, as sand is shoveled and drawn from a sand-hole. There is no danger from frost, so much dreaded with water-closets.

One of the most perfect absorbents for this purpose is dry soil which contains a large amount of clay, the best and most convenient form of which is *road dust* where such soils prevail. Clear sand or gravel is of very little or no value. Coal ashes are more generally accessible in large portions of the country, and when sifted and perfectly dry answer an excellent purpose, in sufficiently large quantity to keep the whole mass dry. The best of all absorbents for common use is a mixture of ashes and road dust.

Contrivances have been made by which the movement of the cover in the closet throws down a pint of ashes; and other and simpler ones require only the pulling of a knob or button to effect this purpose. The first mentioned is liable to get out of order, and the latter is little better than to keep a supply at hand in a box or barrel, with a long-handled tin dipper, for every visitor to use. This mode costs almost nothing, is never out of order, and if every person uses it, there will be no odor and no drainage. A trial of this method by the writer, with perfect success, for about thirty years, has proved its value. There is no excuse whatever for any country resident or farmer who has not made provision for something at least as good as this simple and cheap contrivance, or does not see that it is properly attended to and used.

It must be remembered that this treatment applies only to vaults; and that slops and dishwater must be carefully excluded, and be provided for in a way elsewhere mentioned. If the absorbents are left exposed to the wet, or not regularly applied, tbe result will be a failure; but there is no necessity whatever for any such neglect; a few seconds daily is all that is necessary in applying it, and the coal used by any family will more than supply all the absorbents needed to abolish utterly all offensive odor.

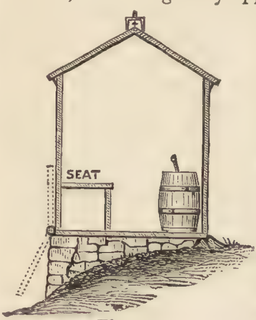

Fig. 30.

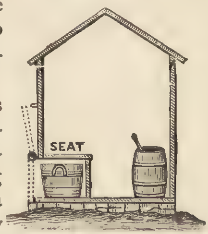

Fig. 31.

There are two modes of applying these absorbents, as represented by the accompanying figures. In fig. 30 a small vault is made by excavating in sloping ground, and building a stone wall on three sides, and leaving it open in the rear, where the bottom is nearly level with the ground. A door hung on hinges at the top keeps the vault closed, except when the contents are drawn away, when it is hooked up, as shown by the dotted lines. A small, neatly painted barrel is filled with sifted coal ashes or road dust, and a

dipperful is thrown down by each person. In fig. 31 there is no vault below, and a door at the rear, which may be hooked up, admits a tub, which receives the ashes, and is carried out when full, and wheeled to the manure yard. This tub may be made of a kerosene barrel sawed in two, with iron handles screwed on at the sides. The tub is to be emptied when nearly full, which may be in two weeks or a month; the vault beneath will not need emptying in less than three months or more, provided all effluvium is completely prevented by a regular and copious use of absorbents. It is better to use these freely and abundantly than to permit any odor or moisture, and it is important that all rain or surface water be excluded.

With these precautions constantly observed, it will answer to place

Fig. 32.—*Sheltered Avenue.*

these closets near the dwelling; but as a matter of safety, in case of the carelessness of occupants or servants, it may be better to give greater space between them. To prevent exposure in winter, the walk should be flanked with evergreens, which may also extend over head and form a sheltered avenue, (fig. 32,) a plan for which is shown in fig. 33, by the walk on the left leading to the boundary of the vegetable garden.

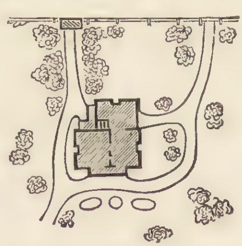

Fig. 33.—*Sheltered Walk.*

Kitchen Slops.

When these impure slops have been discharged so as to pass under the dwelling, typhoid fever and other diseases have sometimes been the result. The most fatal effects have arisen when portions of these slops have found their way, through leaks, into the water used for drinking. When they have been discharged into an offensive puddle at the kitchen door,

the effluvium is less poisonous, as the sunshine and wind diminish the deleterious effects. It has long been a puzzling problem to devise some easy and safe way to get rid of these slops at country residences, one of the difficulties being the carelessness of the hired "help." If they could be induced to carry these slops several yards from the door, and discharge them on the grass, *selecting a new spot each successive day*, the remedy would be nearly perfect.

Another mode is to provide a large underground drain, extending several rods distant, and discharging in a large underground reservoir, where the earth will gradually absorb all impure matter. If the surrounding earth is insufficient to absorb all, the reservoir may remain open, with only a cover against rain, and be filled with dry loam, road dust, coal ashes, or other absorbent, which is shoveled out and drawn away before it becomes saturated. Wherever this mode is adopted, or an underground drain is used, there spould be a "trap" at the kitchen sink, or at the place where the slops are poured, to prevent the bad air from the drain from entering the house or poisoning the premises.

Another mode, which may be adopted where the owner can give personal supervision to see that it is faithfully carried out, is to place a large tub (half of a kerosene barrel answers well) at the kitchen door, and fill it with coal ashes, road dust, or other absorbent, to receive the slops. When saturated. it is carried and emptied on the vegetable garden or adjacent grounds. It may be carried by two men by means of poles fastened with screw bolts to the sides of the tub, (fig. 34,) or it may be more conveniently placed on wheels. This mode is better than providing a cover for the tub and pouring in the slops without any absorbent.

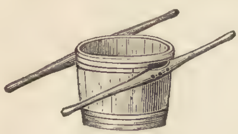

Fig. 34.—*Tub for Carrying Slops.*

Whatever be the mode which is adopted, it is absolutely necessary, so long as health is an object, that putrid air shall be excluded, and more important than all that no impure water shall find its way into reservoirs used for drinking, by soaking through the earth, or through any leaks. No one mode can be recommended or adopted for universal use, and different localities may require different systems for their special peculiarities.

TRAPS.—The simplest trap to prevent the escape of bad air from an underground drain to tbe kitchen, is the pipe-trap represented by fig. 35. The pipe has simply a descending curve, sufficient to become filled by the water which settles in it, and thus, although the water can flow freely, the air cannot pass from one part to the other. An objection to this trap is the liability of sediment settling in the lower portion and eventually filling the tube, which may be prevented by

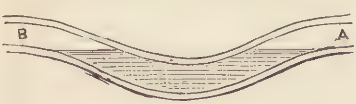

Fig. 35.

"flushing," or driving a strong current of water through it for a moment. Fig. 36 exhibits a mode by which the sediment is easily removed by taking off the

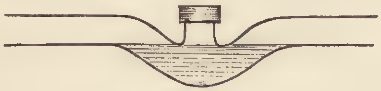

Fig. 36.

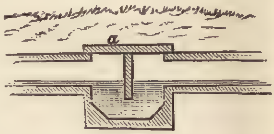

Fig. 37.

cap from the short tube. When the channel or sewer is made of masonry, with hydraulic cement, under ground, the trap shown in fig. 37 may be adopted, and the iron plate *a* removed for cleaning, after having taken off the earth above it. A "bell trap" is shown at *a*, fig. 38.

While pure water is readily conveyed in pipes less than an inch in diameter, the soap and grease from sink-water will after a while choke up those which are much larger, or even three or four inches in diameter, by adhering to the interior surface as it becomes cooled in its progress. Henry F. French describes a method for treating sink-water, which had been in successful use five years, the out-door fall being only one foot in a hundred, and requiring little skill in construction: "At the sink is a common bell trap, *a*. A lead-pipe of an inch and a half or two inches bore runs down and out, through the ground, into a reservoir, *b*, which may be a strong oil-cask of fifty or a hundred gallons. It should be a foot below the surface, and properly covered, so as not to freeze. The lead pipe should discharge under water, making a second trap, which prevents any bad air passing up the pipe. The outlet pipe, *c*, starting one-third up from the bottom, may be of lead, two inches bore, and should run upward and out of the reservoir at a third from the top, into a large pipe of stone or iron. Thus the water enters by the lead pipe about mid-way from top to bottom, leaving the greasy particles floating on the top, and the heavy particles at the bottom, so that what runs off is comparatively clear. It still carries off a great deal of soap and deposits it at a long distance. At our house a five-inch stone pipe runs one hundred feet to the barn cellar, where it is again trapped in a cask, and carried thirty feet further, to the manure heap under the stable, far enough and low enough to keep it out of the well. The stone pipes fit, and are made tight with cement.

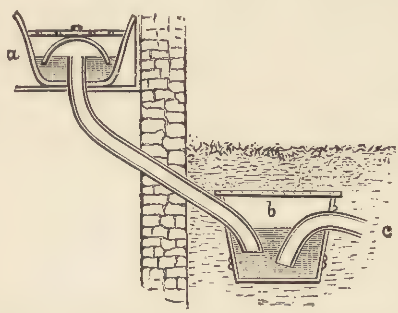

Fig. 38.—a, *Bell-trap*; b, *Reservoir*; c, *Dircharge-pipe*. (*The engraver has made the pipes much too large.*)

A swab should be used to rub down the cement inside as each joint is laid. Three or four times a year the cover of the reservoir should be removed, and everything cleared out"

Another contrivance, copied from the Massachusetts Health Report, is shown in fig. 39, and is similar in its operation to the one just described, but is built of masonry, is on a larger scale, and is more complete in its parts. A brick tank is laid in hydraulic cement, plastered smooth inside, and placed near the cellar wall, with the sink close to the opposite side of the same cellar wall, so as to give a short pipe between the two, and prevent the grease from congealing in the inlet pipe between the two. For houses of medium size the tank may be about two feet or two and a half feet square, the bottom about two feet below the outlet pipe, which turns down about a foot, with a smooth, round turn, the mouth being always under water. The inlet should be half a foot higher than the outlet, to allow the grease to collect that thickness above the water line. The whole must be covered so as not to freeze. This tank is to be cleaned out as often as the grease and sediment collects in large quantities. If care is taken to separate the richer portions of the dishwater for the pigs, and to pour only watery slops into the sink, the tank will not need frequent cleaning.

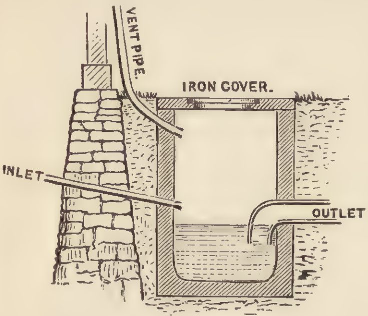

Fig. 39

Filtered Rain-Water.

While there are so many dangers on almost every hand from the use of the water from wells, especially in towns and villages, there is one resort that is always safe, and that is *filtered rain-water*. The water which comes from the clouds is not absolutely pure, as it brings down in small quantities the impurities which float in the air, or which lodge on roofs or in gutters, but nearly all may be removed by filtering, and the water will be rendered clear and tasteless. The addition of pure ice makes it entirely palatable.

George Geddes, whose scientific and practical knowledge combined is equalled by few persons, gave a detailed description in the Country Gentleman, of a cistern and filter for the use of rain-water, from which we condense the following account:

"The cistern is made only six feet wide, for convenience in covering.* It is twelve feet long and seven feet deep, and will hold 4.000 gallons. The

*The accompanying cut (fig. 40) is not an accurate representation of this cistern, but will serve to explain its general operation.

walls are of stone laid in hydraulic cement. The bottom is four inches thick, of concrete, made of nine parts of gravel and sand to one of hydraulic lime, just moistened, laid on in a mass and pounded hard. The lower course of the flat stones of the wall (the footing) projects four inches into the cistern, preventing any crack. The top is covered with two limestone flags six inches thick, resting on the walls, with a man-hole at one corner, the whole so covered and fitted with cement that no insect or surface water can enter, except through the leader from the roof. A flag-stone cemented at the edges covers the man-hole; and this is surrounded with a

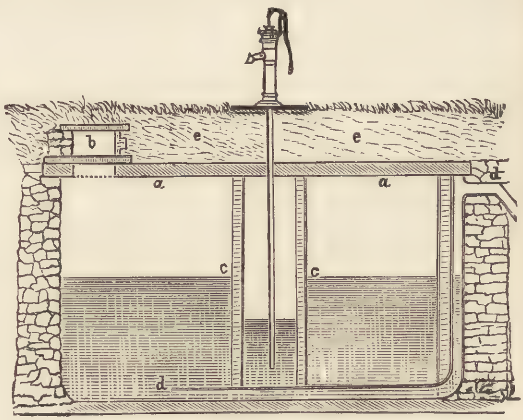

Fig. 40.—*Cistern for Filtering*—a a, *Flags for Cover;* b, *Man-hole;* c c, *Vertical Shaft for Filtering;* d d, *Overflow;* e e, *Earth.*

brick wall a foot high, and covered with another flagstone, made air tight with cement. This leaves a foot of confined air, and excludes frost. This is covered with a foot of earth and turfed, and the whole cistern covered with earth.

The filter in this cistern is a vertical hollow cylinder, of brick, two feet inside diameter, laid in hydraulic cement, and extending from the concrete bottom to the top covering, with an air-hole an inch in diameter, to allow the air to escape as the cylinder fills with water. The bricks used are good weather bricks, such as would be used for the top of a chimney. The circular form resists like an arch any sudden pressure of water against the outside. The water soaking through the four inches of brick is so well filtered that it answers perfectly the intended use.

The overflow from this cistern is made so as to give an escape for the filth which comes from the roof, preventing the necessity for frequent cleaning. The leader from the roof enters at one end, and the waste passes from the other end. A channel is made of five-inch tiles across the bottom, beginning about three feet from where the entering water strikes

the bottom, and thence by a brick flue against the side, four by six inches, to the overflow channel at top, which has a sharp descent through tiles, terminating in a four-inch galvanized pipe, with a self-acting valve at the bottom, which is closed when no water is running, thus excluding vermin. The whole channel inside the cistern is well cemented.

Mr. Geddes adds that for more than a quarter of a century he has used filtered rain-water for all domestic purposes in his family, and during all that time there has been no disease that could be charged to bad water.

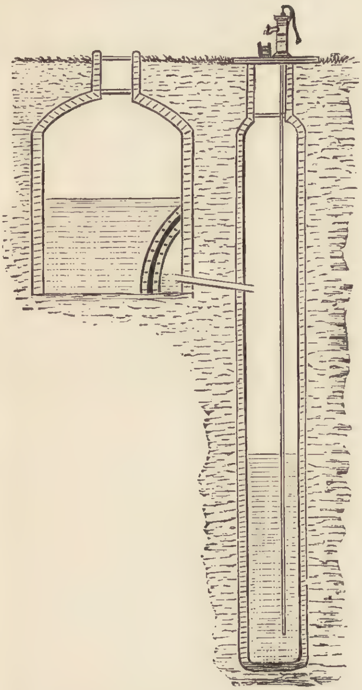

Fig. 41.—*Deep Cistern for Filtering and Cooling the Water.*

When ice cannot be procured for cooling the filtered water, the following method described by Suel Foster in the COUNTRY GENTLEMAN for 1877, may be successfully adopted: The cistern for holding the filtered drinking water is twenty-four feet deep, and the water it contains is as cold as in a well of this depth, (fig. 41.) It is arched with brick over the top, the arch starting six feet below the surface. The cistern which receives the water from the roof is seven feet deep, and is placed at the side of the deeper one, with a pipe-tile connecting them. The filter is made of two walls of brick on edge, enclosing two inches of charcoal, the whole in a curve, with about ten square feet of surface. The water passes freely through the brick. The washing of the roof, and all warm rains are turned off, and no waste pipe is required. The accompanying cut (fig. 41) will show the general structure of these cisterns. Mr. Foster employs a chain pump, which keeps the water stirred, and plastered the cement on the smooth face of the earth, using bricks only for the arch at the top.

POISONED MILK.—Milk watered from impure sources has brought on the same diseases as when bad water is used alone. A case is reported in an English city where a milkman, by impure watering, infected forty-seven out of fifty families with disease.

Water in Sewers.

The impure water of sewers in towns should be conveyed away from the neighborhood of dwellings, and one of the best modes of disposing of it for useful purposes is to apply it for irrigating land. In towns and cities where there are large quantities, two modes have been adopted, one of which is to discharge the sewers into rivers and smaller streams. This pollutes the water of the streams, and has in this way carried disease to the lower portions of the towns or to inhabitants living on the banks in the country.

The other mode is to employ it for irrigation. If it can be securely conveyed in large pipes or sewers to farms in the neighborhood, it is quickly absorbed by the soil, and gives an increased growth to the crops.

From English government reports made two years ago, it appears that of a large number of towns, mostly varying in population from ten to eighty thousand, over one-half derived an actual profit from this mode of irrigation, while the remainder made no profit, or met with financial loss, the chief object being the removal of the causes of disease at whatever cost.

When sewage is applied to land by way of irrigation, it is necessary to adopt a regular and systematic mode of application. The land must not be flooded at random, but the water evenly distributed through channels methodically laid out, and no more used than the soil will absorb and purify. At Milan, in Italy, 4,000 acres of land are treated with the sewage from the city, or at the rate of an acre to forty persons. At the meadows near Edinburgh, only 400 acres are provided, and the area is not sufficient to take up all the putrid matter, although large crops of coarse grass are obtained. In some low places the abundant supply has made the meadow a mere marsh, that cattle cannot walk over.

The Massachusetts Health Report gives an account of the well conducted sewage farm which receives the discharge from Romford, a town of 7,000 inhabitants, near London. The farm contains 125 acres, or an acre to fifty-six inhabitants. The sewage is brought from the town in iron pipes, and received in storage tanks, from which it is pumped and conveyed in conduits. Among the crops cultivated are cabbages, potatoes, turnips, peas, beans, onions, Indian corn and grass, all of which grow luxuriantly. The lessee of the farm pays the town $3,000 per annum for the sewage supplied for use.

These extensive experiments, although not applicable to common farming, serve to show the value of the impure refuse matter from every dwelling, if used on a small scale and for similar purposes.

A drawback in the successful use of town sewage is the fact that it must be disposed of day by day throughout the entire year, and that its quantity is often greatest when of the least service to the land.

Disease Prevented by Draining.

Dr. Kedzie of Michigan estimates that 20,000 miles of underdrains were constructed in that State in the ten previous years, with a marked decrease of malarial diseases, some physicians stating that they had been reduced to only one-half, or even to one-fourth of their previous numbers. Draining would strongly tend to prevent impurities from passing into wells.

The Massachussetts Health Report states that "intermittent fever has ceased in certain parts of Great Britain, and in this country, under the influence of tillage and drainage of the soil." Official records state that in England and Scotland "the life of the people gains from 20 to 25 per cent. in years, and they suffer less than half the average sickness and disability in the well-drained districts."

An interesting case bearing on this subject is given by Dr. Wilson of Flint, in the Second Report of the Michigan Board of Health: "In the town of Gaines, in this county, twelve years ago, was a marsh of over four miles in length, by one and a half miles in width. So fatal were its emanations in summer and early autumn that it had acquired the name of "dead marsh." Since then it has been drained, and been made into one of the finest farms in the State. The drainage has been thorough and complete, and a more salubrious and healthy region is not to be found in the State." The same report states that in former years dysentery and malarious fevers prevailed in Detroit; but with the general introduction of pure lake water, and the extension of the sewerage system throughout the city within the past ten years, they are rarely met with and never in any endemic form.

Pulmonary Consumption from Bad Drainage.—The Fifth Annual Report of the Massachusetts Board of Health states that "investigations in Europe and America have proved that residence on a damp soil brings consumption, and that the drainage of the wet soil of towns tends to lessen the ravages of that disease." For this reason the dwelling should be placed on ground which is always dry, either naturally or by through underdrainage; and the cellar must be cemented so as to be always dry.

Many instances are given in the report above mentioned, proving the influence of damp situations in producing consumption. A few may be quoted as samples of the rest: In one case the house was low, with many shade trees, and cold springs issued from the hillside back of the house. The children all died of consumption before twenty years old. They were always better when sent from home; returning, the cough came back. A farmer resided in a valley near a stream; he lost his wife, two sons and one daughter from phthisis, within five years. A farmer near Pittsfield built a house on wet soil. He and his wife lived to advanced age; there was no consumptive taint in either. Of their eight children all died of consumption. In the same neighborhood, another farmer lived on high

and dry soil. He lived to be ninety, his wife eighty, and their seven children, who have reached or passed middle age, are all living.

Impure Ice.—The opinion has been thoroughly disproved that the freezing of water removes its impurities. A case is reported by Dr. A. H. Nichols of Boston, furnishing strong testimony on the subject. At Rye Beach, in New-Hampshire, in 1875, a large number of the three hundred guests of a hotel were attacked with a mild epidemic. The two hundred guests at another hotel, one-eighth of a mile distant, entirely escaped, and so did the five hundred visitors at boarding houses.

A careful examination was made to discover the cause. The wells were on an elevated ridge far removed from any source of impurity. Good drainage of the house had been secured by competent engineers from Boston. The kitchen utensils were found to be scrupulously clean. Some of the guests, suspecting the water, had entirely avoided drinking it, and substituted melted ice. This, in several instances, produced nausea, and on examination was found to be more or less turbid, and with a slightly fœtid odor. This ice, it was ascertained, had been taken from a shallow pond, containing, among other decaying matter, large quantities of sawdust from two neighboring sawmills, which, being mixed with mud, created a mass of offensive matter. The use of the ice was immediately discontinued, and all the guests at once recovered. The water from this ice was analyzed and found to contain eighteen times as much foreign matter as that supplied by the Boston Ice Company.

Barnyard Odors.—In order to escape the bad air from barnyards and pig-styes, it is often recommended to place them at a distance from the dwelling. This recommendation of distance is well, but a good farmer should not permit offensive odors at his barns. Absorbents should prevent fumes from manure; stables should be kept constantly clean; and the quarters for pigs should be entirely free from effluvia, by thorough cleaning twice a day, and by plenty of dry litter and absorbents. Pure air is important for the health of animals, and the milk of cows which is placed on the table should not come from scenes of pollution. So long as human beings eat pork, pigs should be supplied with clean apartments and pure air.

Water Purified by Boiling.—When the late David Thomas conducted the company of exploring engineers for the Erie Canal between Rochester and Buffalo, he directed all his assistants to drink no water in that newly settled region, that had not been boiled. Those who adhered to this order remained in health through the season; those who disregarded it all became sick with fever. An English commission on this subject say, in their report, that "boiling the infected water for half an hour is a probable means of destroying its power of communicating these diseases." They allude to cholera and typhoid fever. Prof. Brewer reports the case

of a prisoner at Andersonville, during the war of the rebellion, who was one of the first sent there, and who came out well. He never drank impure water without boiling it. He was often detailed to bury the dead, and on these occasions he brought back roots and wood for this purpose.

TEST FOR WATER.—To ascertain if water is free from organic matter, fill a quart glass jar, perfectly clean, with the water, and set it uncovered in a closet free from dust, and if it will remain bright and sweet for several weeks, it may be regarded as good and pure.

Water is sometimes poisoned by remaining in lead pipes. If there is much tendency to colic, and if the gums have a slightly bluish color, lead poisoning may be strongly suspected. Whenever lead pipes are used, although all kinds of water will not dissolve it, make it an invariable rule to run off, the first thing every morning, all the water that has stood in them over night.

MUSHROOM CULTURE.

THE FOLLOWING PRACTICAL REMARKS on this subject are furnished by JAMES VICK of Rochester, N. Y., to whom we are indebted for the illustrations:

"Many of our readers, were they to see the immense consumption of this fungus in Europe, especially in France, and were they as fond of mushrooms as we are, would appreciate its importance. There are growers of mushrooms in the suburbs or Paris that gather and send to market more than two thousand pounds a day each, and some that have nearly a score of miles of mushroom beds. Then there is something so singular, almost wonderful, about mushroom culture—no seeds or roots planted—only a few pieces of dirt, apparently, stuck into the bed—and yet a crop of pearly whiteness is produced, as if by magic. Until it becomes an old story it is quite as exciting to the boys as 'going-a-fishing.'

"Our readers are, of course, acquainted with mushrooms of the meadows, so abundant in many places in the damp, cool weather and dewy nights of autumn. Some pass them without notice, or think of them only as toad-stools, while others seem to rush for every tiny specimen as eagerly as though they were gathering diamonds. We were desired to show how mushrooms can be cultivated so as to secure a supply during the spring and summer season, and before they can be obtained from the fields.

"The mushroom is a very accommodating plant, and will grow in the cellar, in sheds, stables, tubs, old hats, on shelves in the garden, in dark or light. We have seen them growing in old tubs, somewhat as repre-

sented in the engraving, (fig. 42,) in out-of-the-way corners of sheds, in dilapidated and abandoned greenhouses, on shelves in stables, the per-

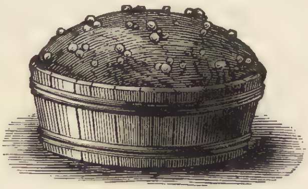

Fig. 42.—*Tub with Mushrooms.*

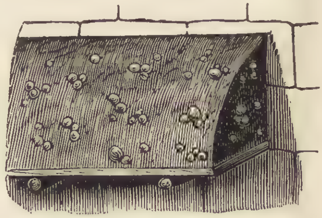

Fig. 43.—*Bed against a Wall.*

quisites we presume, of the hostler, and in every case giving apparently a good and healthful crop. Fig. 43 shows a shelf-bed attached to a cellar wall.

"All that is needed for success is a temperature from 50 to 60 degrees, some fresh horse manure, and a little *spawn.* Having procured what fresh horse manure is needed, mix it well with about one-third its bulk of good loam, and you are prepared to make your beds in whatever form and in whatever place you prefer. If you determine to form beds, make them narrow, certainly not more than five feet in breadth, and about fifteen inches in height. The material must be made compact by beating down as evenly as possible. If under cover, the beds may be made flat on the top; but if in the open air, should be rounded, to shed the rain, somewhat as shown in the engraving, (fig. 44.) After the beds have been

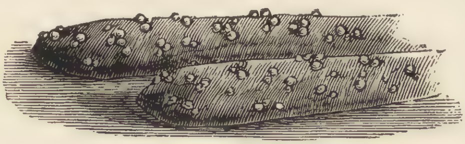

Fig. 44.—*Rounded Beds.*

made a week there will be considerable heat produced by the fermentation of the manure. Bricks of spawn should be secured previously, and they can be had of most seedsmen, postage or expressage free, at about thirty cents a pound. Break them into pieces about as large as walnuts, and insert in the beds, just below the surface, about ten inches apart. One pound of spawn is sufficient for a space two by six feet. If there seems to be much heat, do nothing for a week or ten days, until it somewhat subsides. Then cover the bed with an inch or more of good earth, pressing it down with the back of a spade. It is not likely, in a large bed, water will be needed at all; but if the material should appear very dry, water lightly with warm water. In small beds or pails, or anything of the kind, it is probable water will be needed once or twice. Mush-

rooms will begin to appear in about six weeks after planting the spawn, and can be gathered for three or four weeks. In gathering, take up the mushroom entire, leaving no stem in the bed, and placing a little earth in the hole made by its removal. When the crop is gathered, cover the bed with a little more earth, beating it down gently, and give a pretty good moistening with tepid water, and in about a month more another crop will be produced.

Fig 45.—*Bed of Mushrooms Painted with Lamp-black.*

"In closing we give a view (fig. 45) of what some mischievous and artistically inclined boys did to a mushroom bed by the aid of a little lamp-black, converting the innocent fellows into goblins or fairies, or something of the kind."

Peter Henderson, who has raised mushrooms for many years with success, gives the following among other essentials in their culture: Raising under some shelter, as in a shed, stable, cellar, &c., and not in open air; giving them a temperature of 40 to 60 degrees; using fresh loam from a pasture or sod land to mix with manure, as old manured soil may contain spurious fungi; turning the heap every day, to prevent violent heating; beating each successive layer down compactly in making the bed; beginning preparations early in winter, so as to obtain mushrooms in February and March; not allowing the temperature to go below 40 degrees to retard the crop, and to be careful to delay covering the bed with mould, when first made, ten or twelve days. Mr. Henderson says he utterly failed the two first years by putting on the mould as soon as the bed was made.

Out of hundreds of species, there is but one that is commonly employed in mushroom culture—the *Agaricus campestris.* It is distinguished by its small, round, whitish head, of a delicate pink color beneath; the stem about three inches high. When well opened, it appears as shown in fig. 46. The top changes to brown when old. When it first appears it is almost globular, and is then called a *button.* It is found in all the four quarters of the globe. There are some other species which may be eaten, but this is preferred; and there are many species which are poisonous, and have caused deaths, most of which have a disagreeable odor. There is one, *A. muscaricus,* which is a beautiful red, but is a deadly poison. It is safe to use only the common, well-known, cultivated sort. Mr.

Vick gives a figure, however, of a good edible mushroom, which we add, and known as the Morel (*Morchella esculenta,*)—fig. 47—which is much esteemed in some parts of the country.

Cooking Mushrooms.—Mr. Vick says: "When we were younger, and hunted

Fig. 49.—*Agaricus campestris.*

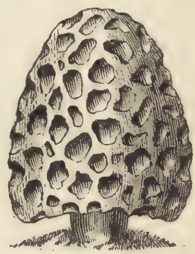

Fig. 47.—*Morel* (*Morchella esculenta.*)

mushrooms in the meadows, we sometimes made a bonfire, and after skinning them, would turn them upside down, like an inverted umbrella, put a little salt around the stems and roast them on the live coals. They are excellent put in a frying-pan with a little butter and salt, to be eaten with beefsteak or roast beef. A dozen in a meat-pie is a treat fit for the King of the Sandwich Islands." He adds the following mode, which is not unlike the many modes adopted by different persons: "Peel both tops and stems, put into a stew-pan, with one ounce of butter and a pinch of salt to each pound; cover with water and stew gently, after once coming to a boil, ten minutes; then put in three tablespoonfuls of milk, or one of cream, to each pound, and serve up hot. This is a dish for fish, flesh and fowl, fit for a king. Season to suit, with more salt, red or black pepper. Mushrooms fully opened, but still flesh-colored underneath, are best. They are also excellent broiled on toast.

To Fry Mushrooms.—Peel, then dip in egg and roll in cracker crumbs. Season with pepper and fry as oysters."

The following is the substance of the mode of making the spawn, as described by Peter Henderson: Take equal parts of horse-droppings, cow dung and fresh loam; work them very thoroughly together, like mixing mortar; make into cakes like bricks; half-dry them on edge, under cover; insert into each a piece of spawn as large as a hickory nut; when quite dry make a pile of them a yard wide and a yard high, on a floor on which eight inches of horse-dung has been spread, and cover with manure, to get a gentle heat. In two or three weeks they are thoroughly inoculated, and if removed to a dry place, will keep good for years.

FARM BUILDINGS—COUNTRY IMPROVEMENTS.

THE MISSION of every patriotic land owner should be to improve and elevate the farmer's business. This every one may do by presenting to his neighbors a specimen of neat cultivation, and finished and convenient buildings. He may exhibit an attractive specimen of country life, which will not only enable others to imitate or excel him, but he will make the occupation of the farmer appear attractive to his sons and daughters, and they will be less disposed to seek town life and town business.

Beautiful, well cultivated fields, with heavy crops, scarcely ever fail to interest any one who sees them. To make the entire surroundings of the farmer's home really attractive, his dwelling and his barns should be pleasing objects, and should possess a neat, comfortable, home-like exterior, as well as interior. We have heard the successful farmer falsely described as the man who can heap up the most money without regard to anything else. He has no dooryard properly so called, or its rear is occupied with cattle and fat pigs, and the front of his house is cut up with wagon-tracks in drawing his heavy loads of grain to market. His study is to raise the heaviest crops at least cost, which is well; but he lives parsimoniously, in order that he may accumulate money without making his family comfortable. His wife is a slave, and his children see nothing pleasing in living on a farm. Such men are often pronounced good managers, but we cannot at all agree with that opinion. The best farmer is he who has, through his calling, done the most good to his family and those around him; who has enamored his children with the beauties of the country and its occupations; who has in this way kept his sons from seeking for their amusement the drinking saloon and gambling hall, and has given them a taste for intellectual pursuits instead of remaining in ignorance and mental idleness. The good farmer not only makes agriculture financially successful, but he elevates it in character and respectability. He can teach his children the arts of gardening—to raise fruit, to bud and graft, to cultivate flowers, to study ornamental planting, to experiment in vegetable physiology. One room in his dwelling should be a domestic museum—occupied with a collection of minerals, a herbarium, cases of insects, and a literary and philosophical library, where all may resort during stormy days or long winter evenings, for instruction and entertainment. "What is the reason," is a common anxious inquiry, "that so many young people leave the farm for the city?" Simply because so little is done to make country life attractive in the many ways and with the many facilities that are so richly afforded on every hand.

Improved Farm Buildings.

Much may be accomplished for the improvement of the farmer's business, in making it both more profitable and more interesting as a pursuit

by the proper construction and finish of the house he is to live in, and the buildings which are to furnish appliances and shelter, in the working of the great annual routine of operations. Good barns are all-important. They should comprise three great leading requisites: They must give ample room for the shelter of the harvested crops, and for the animals which stock, and feed on, and ornament, and enliven the farm; they must be readily accessible for entrance in filling; and they must be so arranged internally, that the daily feeding and attendance of the animals they contain, and the transfer of hay, grain, and other feed, from one part to another, may be attended with as little labor as possible, including the various operations connected with threshing, cleaning and storing grain, and the conveyance of manure.

Construction of Barns.

It may be well, in this connection to devote a few minutes to some of the general details in the construction of barns. It is important that the farmer who is about to erect any building, should make a careful estimate of what he wants, of the amount of grain, hay and other products which he wishes to secure and shelter. He must determine approximately what his crops will be, and then ascertain the required capacity. He must then sit down and count the cost. Such estimates are often the vaguest guess-work, instead of the result of careful computation. As a consequence, barns are made too small, and grain, instead of being housed, is stacked outside, and exposed to rains and rotting. Additions, if erected, are at the expense of convenient arrangement.

Estimating their Capacity.

The mode by which accurate estimates are to be made, may be illustrated by an example. Suppose that we have a moderate-sized farm of 100 acres of land, devoted to meadow, pasture and grain. Ten acres may be corn, but this, when husked, will go into a separate building. Thirty acres of meadow, at two tons per acre, would give us sixty tons. Twenty acres of sown grain would afford a corresponding bulk of straw, and amount to forty tons. No estimate need, of course, be made for the pasture and smaller enclosures. Now, for the 100 tons of hay and grain, estimating an average of 600 cubic feet to the ton, there would be required 60,000 cubic feet of space in the bays. This bulk would be sufficient to fill three bays each 20 feet wide, 25 feet high and 40 feet long. Very few hundred-acre farms have anything like this amount of barn space provided. But the owners may never expect to raise two tons of hay to the acre, although no good farmer should be satisfied with a pound less. Take off then one-third of the whole amount, and still this moderate farm would require two bays 20 by 40 feet, and 25 feet high. But it must not be forgotten that the barn is to contain, beside this ample capacity, space for stables, granary, threshing floor, horse-power, and

for other purposes. This estimate is intended to show that on most farms very insufficient provision is made for the storage and protection of farm products.

On large farms, some owners thresh their grain as it is conveyed from the field to the barn. We remember being much interested some years ago in witnessing this operation on the fine farm of Robert J. Swan, near Geneva, N. Y. He has over 350 acres of excellent land, which he has drained with 60 miles of pipe tile, and on which it is not unusual for his wheat to yield more than forty bushels per acre through the whole of large fields. His grain when harvested is not drawn in till it is ripe enough to thresh. He had four or five teams at work conveying the wheat to the barn, so that one load after another kept a constant supply at the mouth of the machine. The thresher was thus in constant operation from morning till night, and several hundred bushels were thus prepared each day for the granary or for market. This mode of management is more easily accomplished now than in former years, since the general introduction of farm steam engines, leaving the horses of the farm at liberty for drawing the wagons.

In such cases, the threshed straw takes the same space in the barn as would be otherwise occupied by the unthreshed grain; and the improved quality of the sheltered straw for the various purposes for which it is intended, must be obvious to any one who has observed the difference between that which is dry and bright, and the half-rotten masses carelessly exposed to the rain and weather.

The increased labor of transfer, when grain is stacked out-of-doors, would soon amount to more than the additional cost of convenient and spacious barns.

Planning a Barn.

The owner who is about to erect a barn should, in the first place, make a systematic arrangement of his wants. We have already pointed out the way for him to ascertain the required capacity. He should next make a list of his several requirements. For example, he may write down the names of the various apartments and divisions, like the following:

1. Bays for hay.
2. Space for unthreshed grain.
3. Room for straw.
4. Threshing floor.
5. Area for horse-power.
6. Granary.
7. Room for heavy tools and wagons.
8. Harness-room.
9. Horse-stables.
10. Stables and pens for cattle and calves.
11. Shelter for sheep.
12. Root-cellar.
13. Manure sheds.

Some would add other apartments, and others would omit a portion of these. But in either case the plan should be fully determined beforehand, and all that is wanted brought distinctly before the eye, and carefully and deliberately arranged in the best manner. In doing this there

is an endless exercise of skill. We have named thirteen different spaces or apartments; arithmeticians will tell us how many million combinations may be made with them. There will scarcely be an end of the various plans which may be devised by or presented to the farmer; but a good arrangement may be reached without great difficulty by bearing in mind that the reception of the largest and heaviest products must have the preference for convenient access; that the threshing floor must be contiguous to the grain bay, and either above or on a level with the granary; that stables for animals should be where they have ready access to the feed, and which will permit an easy conveyance of the manure; and that the thresher and cleaner should stand in a central position for threshing and storing the grain. A short article like the present will not allow entering into minute details; but if some of these leading requirements are borne in mind, they will enable the ingenious owner to devise a plan to suit his peculiar wants, by a comparison with some of the best published and accepted plans, and to correct the errors of badly arranged designs.

Since the general introduction of horse-forks and horizontal hay-carriers on the larger farms, it is less necessary than formerly to build low barns,

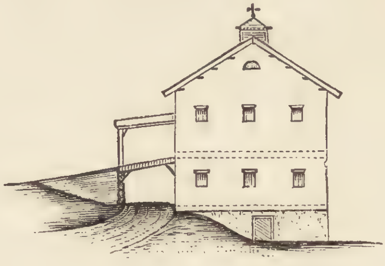

Fig. 48.—*Three-Story Barn.*

or to construct three-story barns the upper floor of which may be reached by tbe team with loaded wagons. There is however a great convenience in a three-story building, where the surface of the ground has a sufficient inclination for the purpose (fig. 48.) The upper floor is reached over an inclined embankment and short bridge, and loads of hay are easily discharged downwards, and grain on a level. If the threshing floor is at this story, the grain, as it runs from the fanning mill or separator, passes down to the granary on the next floor below, from which again it is drawn off into the wagon in the basement for conveyance to market. The lifting of the grain is thus entirely avoided. The intermediate floor is the base of the bays for hay, and may be occupied with horse-stables, tool-rooms, harness-room, granary, and with a central floor for drawing in crops, threshing, horse-power, and for other purposes. The basement may

include the cattle stables, sheep pens, root cellar, cistern and water-troughs, and area for manure.

Three-story barns require sloping ground; but if it is nearly level, two-story barns should be adopted (fig. 49,) with at least 20-foot posts, to give

Fig. 49.—*Two-Story and Basement Barn.*

ample space under the roof, and in this case the horse-fork becomes indispensable.

Every barn should have a basement. It is roofed with no additional cost; and the protection afforded against the decay of the lower timbers, by resting well above the ground on the stone walls, is nearly equal to the cost of excavation and walls. The space thus obtained is therefore nearly clear gain.

In other words, every barn should be at least a two-story one. Even when the ground is quite level, it is not difficult to obtain enough earth for the comparatively narrow roadway embankment on one side, by excavating a foot and a half or two feet in depth (fig. 50.) A slope of one foot in the breadth of the building would make the work easy of accomplishment.

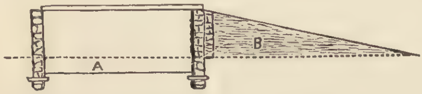

Fig. 50.—*Dotted Line, natural Surface of the Ground*—A, *Space excavated to form embankment* B.

Since the introduction of the horizontal hay-carrier, wider bays may be stored with hay without the labor of side-pitching by hand.

Form of Barn Buildings.

It was formerly a common practice to place the various barn structures in the form of a hollow square. This form protected the cattle yard on each side from the sharp winds of winter, and the central portion was conveniently occupied with the manure heap. There are, however, several objections to this arrangement. A greater surface of outside walls is required than for a single, large, compact structure. The different apartments are necessarily remote from each other, and more labor is consequently required for the daily attendance in feeding animals. It is more difficult to secure a spacious basement. Fodder cannot so well be

thrown down through shoots to animals below. More surface is required for the roofs.

Octagonal Barns.—Many octagonal barns have been constructed of late years, and they appear to be coming into favor for large farms, or where great capacity is required. Among their advantages over the rectangle may be named the following: 1. They enclose a greater space with a given surface of exterior wall. 2. They require fewer cross timbers and ties when properly constructed, and the roof is mainly self-supporting, possessing somewhat the character of an arch resting on the walls. 3. Shorter timbers may be used in building, as the building has narrower sides when compared with its capacity. 4. The horse-fork, placed near the centre, may be employed for working on all sides of the surrounding circle, without changing its position.

The rectangular form for small barns would, of course, be more simple in construction, and may be best adapted to farms of small extent.

Estimating the Cost of Barns.

No enterprise should ever be undertaken without "counting the cost." The owner has made a plan of his proposed barn, spacious enough for all his requirements, but the very important question comes up: "Have I available means sufficient to meet the expense?" To answer such questions as this, we adopted a simple rule many years ago, by which we could quickly make a general estimate with approximate accuracy. The result will, of course vary with the price and convenient access of the materials, and more with the ability and skill of the builder. Nevertheless, it will give a fair average for the country at large, and for good management. It is this: For a common rough barn, well built with unplaned lumber, with a good stonewall basement, one dollar will pay for two and a half feet surface; or if the materials are cheap and accessible, three square feet may be had for each dollar. Take an example: A rough barn 35 by 70 feet has an area of 2,450 square feet. Divide this number by 3, and the quotient will be 817, the lowest sum in dollars for which the barn could be built; or by dividing by $2\frac{1}{2}$ we obtain the number 980, which represents the number of dollars it would be more likely to cost under ordinary circumstances.

If the barn is built of planed lumber, with good finish, and painted outside, one dollar will pay for two feet square, with the variations already mentioned. The barn, 35 by 70 feet, and containing 2,450 square feet as before, would cost about $1,225. By adopting ornament and high and costly finish, the price might, of course, be increased indefinitely.

By employing this rule, with its modifications, the young farmer may arrive at a tolerable knowledge of what he will have to expend, and he may know whether the builder who takes the job will charge an extravagant price.

Other Buildings, as sheep-barns on large sheep farms, pig-houses,

corn cribs, dairies, ice-houses, &c., are mostly separate buildings, each of which would require a treatise for its construction and management.

Various General Details.

There are many details of general application which should be borne in mind in building barns, a few of which may be worthy of being briefly mentioned:

1. All barns should have good eaves-troughs, connected with spacious underground cisterns. They will protect the walls, and furnish domestic animals a large supply of water, or no less than five barrels daily through the year, from a roof 35 by 70 feet, if there is an annual rainfall of 3 feet.

2. A broad, projecting roof, by sheltering the sides of the building, adds to its durability.

3. The basement walls should stand on a broad, deep trench filled with small stone or coarse gravel, to effect drainage; and if thick flagging, projecting some inches beyond the walls on both sides forms their base over the small stone, rats will not burrow under them (fig. 51.)

4. In building basement walls, there should be a space of a foot between their outer face and the bank of earth, the excavation being a foot wider on each side for this purpose, which enables the mason to build a smooth outside, and to avoid the projecting points of stone, which, when the earth freezes in contact with them, dislocates the wall. The outside space is afterwards filled with broken stone or gravel, and allows a free drainage into the ditch under the walls, as shown in fig. 51.

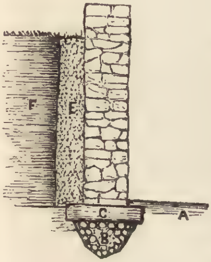

Fig. 51.—*Cellar Wall*—A, *Cellar Bottom;* B, *Drain;* C, *Flagstone;* E, *Gravel Space;* F, *Earth.*

5. Never allow an embankment of earth subject to freezing to press against a basement wall, the successive thrusts of the frost, sooner or later, throwing it over. A vertical stratum of coarse gravel or small stone should be interposed, as already mentioned.

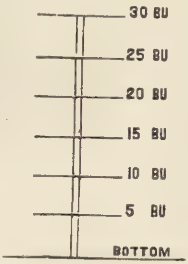

Fig. 52. — *Graduated Granary, inside.*

6. The most convenient barns now built have the interior of the main floor entirely free from partitions, so that loads of hay and grain are driven in on any part, and separate narrow bays of any desired width are built up successively. When consumed or threshed these portions are taken down in succession.

7. Every granary should be graduated on the inside, to show the number of bushels it contains below each graduating mark—enabling the owner to know at a glance how much grain he has on hand (fig. 52.) This graduation may be easily made by multiplying the cubic feet by 45, and dividing by 56.

8. Petroleum for inside floors makes them more durable; and for outside woodwork it is better than paint, penetrating into the pores, and giving common wood the character of cedar. Applied to the outside of this a coat of Averill paint (which adheres better to the oiled surface than any other paint we have tried) forms, with the oil, a very durable and perfect protection against weather.

9. Cattle yards connected with a barn which consists of a single compact building, should be well sheltered with evergreen screens. These form the most pleasing kind of shelter against winter storms, and any one who has seen cattle and sheep reposing comfortably under their broad, green, dense arms, while the snow clouds are sweeping over open fields, could not fail to be struck with their real value. They are the cheapest of all barriers against the storm. Trees of Norway Spruce planted in a line from three to six feet apart, and growing, as they usually do, three feet yearly, will in a few years form a screen so dense that storms cannot penetrate it. For more ample security of earlier growth, it may be well to plant two rows of the trees, alternating, and not opposite to each other.

10. Barns and all out-buildings, whether of high exterior finish or made of rough boards, may be neatly constructed with an architectural or symmetrical exterior. We sometimes receive instructions in works on landscape gardening to conceal, by plantings of trees, the unsightly barn buildings of the farm. They should never be unsightly; but be made

Fig. 53.

positive ornaments—not by useless or costly architecture, but by simple attention to a pleasing outline. A total absence of farm buildings would give to a farm an expression of incompleteness. Well-formed structures, slightly obscured by trees, add to the landscape effect of a country home (fig. 53.)

Farmers' Homes.

It is hardly necessary to speak of the great advantages which a dwelling with beautiful surroundings possesses over one that is unattractive or positively repulsive. But it may be well to remark that an agreeable home must have *three* essential requisites (beside the pleasant and kind faces to be seen there), and these are a neat, well-arranged and pleasing

interior: a symmetrical, architectural, and home-like expression of the house outside, (not necessarily ornate or elaborate, but rather the reverse); and handsomely planted and well kept grounds around it. In these days of diminished finances, none need start back for fear of the expense required to secure these essentials of a complete country home; for the interior arrangements require only skill in designing; the exterior an architectural taste; and the grounds, when once planted, are kept in order mainly by the use of the new lawn mowers at one-fifth the expense of the discarded scythe. Men often put too much money in ambitious buildings and costly structures, when a twentieth part of the difference between these and more modest dwellings, would secure infinitely more beauty in the grounds. We remember well two scenes which we often witnessed in the same neighborhood,—one of a large, showy and expensive dwelling

Fig. 54.

with an unplanted and bleak exterior, and with nothing to make it really attractive; and another house, costing precisely one-tenth the money, converted into a rural paradise, by blooming shrubbery, brilliant flowerbeds, a green velvet of grass, and ornamental trees nearer the boundary. It was once not very unusual to see the contrast between the cheaper class of cottages—the one marked with neglect, with dilapidated walls—hats and rags thrust into broken windows, obsolete barrels, broken boxes, heaps of rubbish, and slop puddles about the premises, (fig. 54); and the other a

Fig. 55.

gem of neatness—a white-walled, vine-embowered home, with its glad surroundings (fig. 55.) We need not ask which would have the best educating influence on the young members of the families who occupied them, and whether it is possible to make a better investment of time and labor than in the few minutes expended daily morning and evening in brushing up and improving such a home.

Selecting a Residence.

The owner who is about to erect a dwelling should, in the first place, secure certain essential or desirable points. He may arrange these in the following order:

1. Healthfulness, as all essential, for nothing can atone for ruined health.
2. Good neighborhood, nearly as important.
3. Good soil—requisite for the successful culture of crops.
4. A favorable climate for the business, so far as other requisites will permit.
5. Convenience of access to market, shops and to places of worship.
6. Scenery and landscape views.

Some would place the last named—pleasant scenery—among the first, and with such we have no disposition to enter into controversy. In fact, we should hardly attempt to convince the man of anything connected with the subject, who did not value beautiful scenery.

Planning a House.

It is entirely out of the question to furnish, in the brief space allotted to this subject, the details for constructing dwellings, and we can only enumerate some of the most essential points. The owner, as in the erection of barns, should make out a list of his needs. If he builds a moderate house, he will at least require:

1. Kitchen.
2. Parlor.
3. Small entry or porch.
4. Nursery or bed-room on the ground floor.
5. Bed-rooms, with closets, upstairs; and, never to be omitted—
6. A good, spacious, clean, well ventilated cellar.

The smallest farm-house should contain all these, and if a larger and better one is intended, the owner should add store-room, wood or coal room, iron closet and laundry to the kitchen; a separate dining-room, and bath-room; and he should not omit one apartment for a library, mineral cabinet, herbarium, cases of insects, and simple apparatus for chemistry and natural philosophy, for the gratification of his growing children, if not for himself.

We wish to urge the importance of making the kitchen and the cellar as neat and clean as any part of the house. The kitchen walls should be neatly papered, and the windows should give abundant light. The conveniences of ready access to coal, and to cistern and well water without passing a door, will be the means of securing a better class of domestics, as we have had occasion to prove by long experience; or if the farmer's wife herself does the work, it will prevent much bodily fatigue.

The cellar should be covered with water-lime cement, kept clean at all times, and perfectly free from anything that can cause the faintest bad odor. If the house is large, the cellar should be divided by 8-inch brick

walls, into fruit-room, milk-room, and apartments for roots, coal, and for furnace.

General Rules.

A few general rules may be added:

1. The kitchen in every country house should be on a level with the principal floor.

2. It should have ample windows, for free ventilation, if possible, on opposite sides.

3. The pantry or dish-closet should be placed between the kitchen and the dining-room, readily accessible to both.

4. Every entrance, except to the kitchen, should be through some entry or hall, for seclusion, and to prevent cold draughts.

5. The cellar stairs should be easy and broad, as they are passed thousands of times yearly.

6. Place the rooms most frequently used in positions for the most easy access; and those less frequently occupied, as bed-rooms, more remote. The entrance hall should, for this reason, be near the centre of the house.

7. It is scarcely necessary to add that the partitions on the upper floors should stand exactly over the lower, to secure firmness to the whole.

Avoiding Household Drudgery.

A formidable drawback on the comforts and attractions of country life, exists in the drudgery to which farmers' wives and daughters are subjected in boarding and lodging a number of hired men. Farmers who are in comfortable circumstances as to property, often compel the women to work early and late in feeding these men, and many have been thus reduced to a condition but little better than slavery. To them rest never comes; through the week days and on the Sabbath the same ceaseless round of cooking, and the many labors connected with it, must be submitted to, and more than a thousand meals must be annually prepared for the men who have their seasons of labor and of rest. The wife of a man who owned 700 acres of beautiful land told us, in her worn-down and premature old age, that she had cooked fifty tons of food, by careful estimate, for the hired men who performed the labor of the farm. But the labor alone is not the only drawback. The rooms of the house are occupied, and the privacy and repose which women ought to enjoy, at least a part of the time, is not to be found. Farmers' daughters see the contrast between their condition and that of wives and daughters of mechanics and tradesmen, and they resolve not to continue in such a life of discomfort by marrying a young farmer. This is a silent but powerful influence operating all through the country to a greater or less degree, and effecting a wide-spread injury to agriculture.

For all this trouble there is an easy and simple remedy, which in our own case we adopted forty years ago with entire success. We found it

attended with much satisfaction, as well as financial economy. It is merely to erect laborers' cottages, and employ married men who board at home. Most of these men continue in our employ for a long series of years. They become familiar with the work, are worth more than fresh hands, and are steady and reliable. By giving them neat and comfortable dwellings, as that shown in fig. 55, the better kind of men are secured. They can board at home more cheaply than we can board them, as their wives, who cook for them, would otherwise have little to do. By adopting this plan, the farmer's wife is placed in almost as comfortable a condition as the wives of the hired men; the farmer's family can have a share of quiet and seclusion, and can indulge in some intellectual enjoyment; home becomes pleasant and attractive, and the women live longer. She who is pronounced by the poet "Heaven's last, best gift to man," may thus receive a share of the help, and kindness and pity, and cheering comfort, which it is so eminently every man's duty to award to her.

Recapitulation.

The chief points which we have endeavored to present, may be briefly summed up in a few words:

Give your farms the best cultivation; raise as heavy crops as you can on a paying basis; let your fields be specimens of neatness and beauty, instead of disorder and waste; the farm buildings marked with convenience and finish, and all their surroundings with purity and cleanliness; the grounds encircling the dwelling handsomely planted with shade trees, and gemmed with blooming shrubbery and brilliant flower-beds; the interior of the house arranged with a view to comfort and the abridgement of household labor; laborers' cottages provided for the men who work the farm; and everything throughout made pleasant and attractive to the young members of the family, with all influences to promote intellectual pursuits. The business of the farmer would thus be placed in a high position among the occupations of the community; domestic influences would take the place of unsettlement and dissipation; and all would tend to favor the cultivation of those social and benignant virtues which smooth the path of life, and brighten all the real enjoyments of the world in which we live.

Botanical Knowledge.—We learn from W. J. Beal, Professor of Botany in the Michigan Agricultural College, that among a quantity of imported flower seeds, was some of the *Leucanthemum vulgare*, recommended as "rare and new, and as excellent for cutting." Prof. Beal's knowledge of botany at once showed it to be the well known *ox-eye daisy*, existing as a persistent weed in the Eastern States by countless billions and whitening the pasture fields of whole States. It is rare in most parts of Michigan, and this timely detection excluded it from the college grounds. Otherwise it might have made a fine display there in a few years.

ICE-HOUSES AND REFRIGERATORS.

A NUMBER OF DESIGNS FOR ICE-HOUSES were given in the ILLUSTRATED ANNUAL REGISTER for 1876, some of which were specially intended as specimens of cheapness and simplicity. Full directions were furnished in the article for the successful management of ice, to retain it without serious loss through the heat of summer. The several designs here given are intended as an appendix to that article. Some of these are for ice-houses below ground, some partly below, and some wholly above. Those partly below, so as to be filled from the high part of the sloping ground, are the most convenient in some respects, but the cheapest structures, and usually the most easily managed, are those which are wholly above ground. These are, of course, the only ones adapted to level ground, where underdrainage cannot be properly employed. But whatever may be the mode adopted, the three requisites must be carefully secured, namely, ventilation above, drainage below, and a non-conducting stratum of sawdust nearly a foot thick, on all the sides, top and bottom.

A CONVENIENT ICE-HOUSE.

GEORGE GEDDES gives, in the COUNTRY GENTLEMAN, the following description of his ice-house, which he has had in use more than twenty years, and which will answer for half a dozen families:

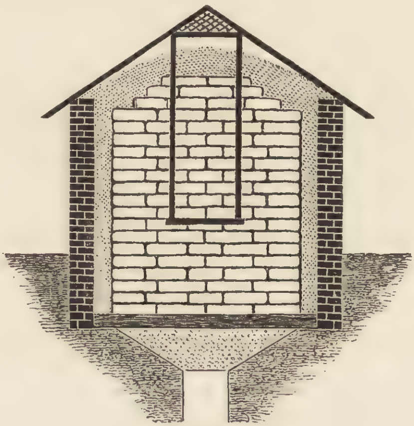

Fig. 56.

"The ground on which it is situated happens to be so open that water will readily sink into it. Taking advantage of this fact, I was able to drain the ice into a pit under it, (fig. 56,) and thus I could have part of the ice

below the level of the ground surface. Convenience in stowing the ice makes it best to have the door-sill just level with the top of the sleigh that brings the ice to it, and the door-sill should be just half-way between the bottom of the ice and its top when the house is full. Thus one-half of the ice is lowered in filling, and one half is raised. The same is true of taking it out for use. The door is $3\frac{1}{2}$ feet wide, and reaches to the rafters. The earth inside the house was given a slant from the walls towards the well in the centre. This well is 6 or 7 feet deep, stoned up like any ordinary well, and covered with wide stones, and over them the spalls made in constructing the walls were laid loosely; this leveled up the bottom even with the walls. Then hemlock boughs were laid over the spalls in sufficient quantity to secure one foot in depth when pressed down by the full weight of the ice. On the hemlock boughs narrow strips of boards were laid, leaving wide cracks between them; this made the bottom, through which drainage passes freely, and which has never been moved or disturbed, remaining good to this day.

"On this bottom the ice is laid, in cakes 2 feet wide and 3 feet long, leaving a space next the walls one foot wide. The space is filled with sawdust well compacted. When the ice is raised 2 or 3 feet, the sawdust is put in place around it, and usually tramped down by the feet of a person walking around as it is put in. Having raised the sawdust to the top of the last course of ice that has been laid, it is swept off clean, and the process is repeated until the house is filled, and the ice covered 2 feet deep with sawdust. The doorway has cleats in the jambs, against which short boards are placed to hold the sawdust at the doorway. As the ice is used, these short boards are taken down as may be convenient. We have a cube of ice 12 feet on all its sides, giving in all $13\frac{1}{2}$ cords—a supply ample for all uses, and a considerable left over every year. Over the door is a triangular space of lattice work, and a corresponding lattice-work in the rear gable. Through the spaces in these lattices the air passes freely, and carries off all vapor rising from the ice, but the spaces being small, no bird or other unwelcome visitor can pass in.

"The roof is shingled, and is not shaded by any tree. Sawdust is used in preference to any other material that we can readily procure to insulate the ice, and the same dust is used year after year, less the waste, which is provided for by going to a sawmill for about one large sleigh load.

"An ice-house should be opened but once in each day during the summer season, and then a competent man should remove the necessary amount of covering, and take out a full supply for all purposes; then restore the covering, carefully packing it about the opening, and close the house for the day. Much waste follows frequent visits to the ice-house, especially by unskilled persons, who dig down to the ice and, by much tugging, perhaps succeed in getting some irregular fragments, and then throw into the place from which they took them some loose

sawdust, through which the air penetrates, and melts perhaps ten times as much ice as has been taken away in this very irregular manner of proceeding.

"There are many places where it is most convenient to construct ice-houses all above ground, and such houses have many advantages; and if constructed of wood, last much longer than if partly under ground."

Milk-House Connected with Ice-House.

Another correspondent of the Country Gentleman, residing in Virginia, gives the following description:

"My ice-house is built above ground, and I have a good concrete floor, with a fall of 6 inches to one point, to conduct the waste water by a lead pipe to the dairy on the outside. The dairy room is 8 by 16 feet. The water trough is 2 feet wide, 16 feet long, and 16 inches deep, also made of concrete, and has been in use for years, never failing to keep milk sweet from 60 to 70 hours. I use the deep cans holding 4 gallons. I have tried the shallow pans, but the water is too cold, and I find the deep cans pay best, yielding 25 per cent. of cream.

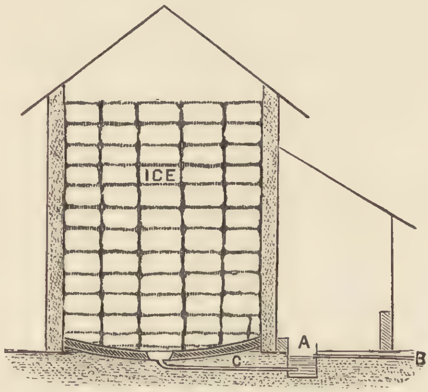

Fig. 57.

"I get from 20 to 30 gallons of milk daily, during the summer, which we strain into the cans and put directly into the water, which stands at a temperature of from 45 to 50 degrees. We never had any occasion to put ice in the tank, the water always being cold enough. The ice-house is 16 by 20 feet, and 14 feet to the plates, and will hold about 100 tons of ice, which will afford 30 tons for family use, and also supply the milk-house during the season, or until the first of December.

"I give a sketch of the ice-house and dairy (fig. 57.) The letter *A* in the dairy is the water tank; *B*, the waste pipe: *C*, the conduit or pipe to con-

vey the water to the dairy. This pipe should be muzzled or come into the tank just below the surface of the water, to prevent air from passing to the ice. This plan has given entire satisfaction."

George Kingsland's Ice-House.

A convenient structure, possessing some special advantages, was built about the year 1864, by George Kingsland of New-Jersey, a description of which has been furnished by J. L. Douglass of Belleville, N. J. It is 13 feet square outside, and 13 feet high, and stands against sloping ground, so as to be filled from above. Fig. 58 is an imperfect representation of its outside appearance. The sides are vertically boarded, and are coated with coal tar against the bank. Although in use fourteen years, it has needed no repairs. A space of one foot in the walls is filled with sawdust, and the roof has a 6-inch stratum of the same.* Fig. 59 is a vertical section, and gives a general illustration of the construction. The floor is of plank. Fig. 60 is a ground plan, showing the entrance above for the admission of ice, and the "cool

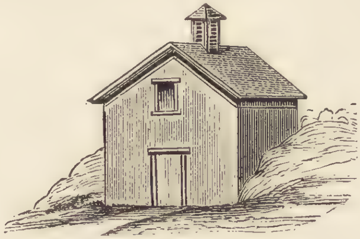

Fig. 58.

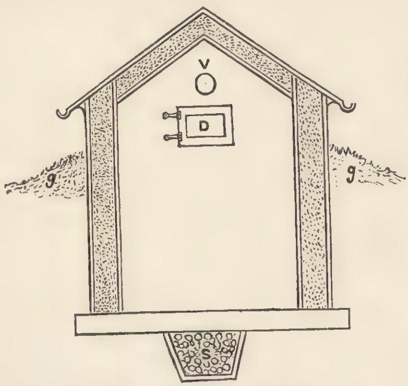

Fig. 59—*Vertical Section—*V, *Eight-inch Ventilator ;* D, *Filling Door ;* g g, *Ground Surface on upper side ;* S, *Stone under centre for drainage.*

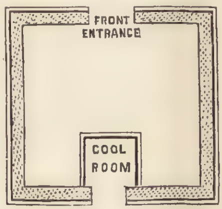

Fig. 60.

*This sawdust in the roof appears hardly necessary, the ice being covered with a stratum of the same.

room" below, lined with shelves, for a refrigerator. This room is 4 by 5 feet, and 6½ feet high, which admits of the ice being packed on the three sides, and on the top. During summer it melts away a few inches. A plank partition of yellow pine separates the ice from the cool room. This room is ventilated by an inch and a half iron pipe through the roof of the ice-house. It is so effectual in summer that meat, milk, butter, &c., remain cold in the hottest weather. The ventilation of the ice-house is effected by two 8-inch openings in each end of the upper portion. The ventilator on the roof, shown in fig. 58, is not employed, although it would doubtless be useful. The cost of this ice-house was $175 complete.

In newly settled wooded countries it might be made of chestnut or other durable logs, put up like a log-house. When vertical boards are used, they might be rendered very durable by two or three coats of coal tar when below ground, and crude petroleum above.

ICE-HOUSE AND WORKSHOP COMBINED.

J. L. DOUGLASS has furnished us sketches of his combined ice-house, tool-room and workshop, and to the whole building is given a handsome

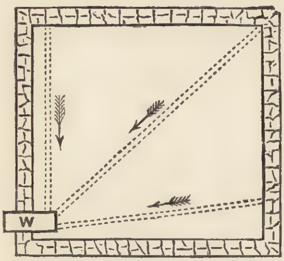

Fig 61.—*Plan of Underground Ice Vault*—W, *Well under wall; dotted lines, Drains to Well.*

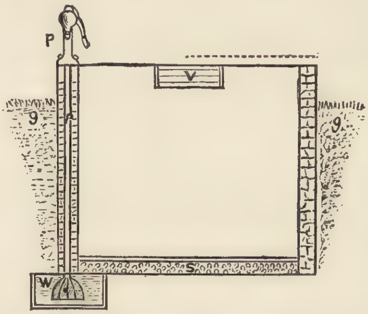

Fig. 62.—*Vertical Section of Ice apartment or Basement*—P, *Blunt's Pump; P, Pump Pipe,* 3 *inches diameter;* V, *Ventilator on each of four sides;* S, *small stones for drainage;* g g, *Surface of Ground;* W, *Well under wall.*

ornamental finish. The ice vault is mostly underground, with stone walls a foot and a half thick. It is about twelve feet deep, and two feet above ground. Each side has a ventilator, and the whole has a large ventilator at the roof. A well under the wall is reached by a Blunt's Universal pump, the pipe of which is three inches in diameter, and encased in the stone wall. The lower end, in the well, is covered with brass wire gauze. The bottom of the cellar is covered with eight inches of small stones for drainage, and this is covered with an inch and a half of gravel. The wall is laid wholly in water-lime cement, made of one part water-lime and three parts of sand. There are two doors on the north side of the ice vault for the admission of

the ice. The tool-room is on the first floor; the work shop above. Fig. 61 is a plan of the ice vault. Fig. 62 is a vertical section. Fig. 63 is an elevation of the exterior.

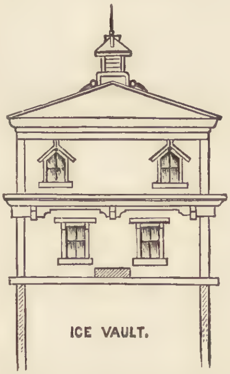

Fig. 63.—*Elevation of Combined Ice-house, Tool-room and Repair Shop.*

Ice-House and Refrigerator.

John Taylor, of Mercer county, N. J., who has had much experience with the use of ice for preserving fresh meats, &c., in summer, says:

"Having spent considerable money in experimenting with the use of ice for curing meats in summer, I have some decided opinions on this subject. Ice of any thickness will keep better above ground than below, if properly protected from air, moisture and heat. My brother, who is in the wholesale butter and cheese trade, has an ice-house about 25 feet square. The cold chamber is on a level with his cellar floor, and is partitioned off from it. The ice chamber is on a level with the upper or ground floor, the space corresponds in size with the chamber below, and when filled has a mass of ice 23 feet square and 12 feet high. This ice wastes about one-half during the season. With the refrigerating room in constant use, the temperature is usually about 35°. This room is lighted by two windows, each having three sets of sash tightly cemented in place. The drainage from the ice is well cared for, and the condensing of the moisture of the room is so perfect that sweeping of the floor at any time will raise a dust. The success of this plan is secured by the absolute protection the builder gave the interior from outside influences, and the simple yet perfect plan of condensing the moisture of the cold chamber.

"I have studied most of the various plans of refrigerating now in use, and am fully satisfied that this is the best for fruit preserving, dairy or curing purposes. I am about arranging one in my pork-packing house on a large scale, and one on my farm for dairy purposes. It is not a patented arrangement."

Mr. Taylor furnishes the following more detailed description of this refrigerator, illustrated with an engraving:

"The drainage of the ice is carried off by a series of V-shaped tin or iron troughs, which run between the joists, all of which carry the water to one point, where it is conveyed outside by a trap pipe. These troughs reach over to the centre of the top of the joists, and are soldered together, so that no water will drip on the floor below. It will be seen that in this plan there is no sawdust or other preservative in contact with the ice, and the air of the room cicrulates around and over the ice. As long as the temperature of the goods stored is above the temperature of the room,

there will be a gentle draft around the mass of ice, and of course all the moisture in the air, vapors and odors from the goods, will condense on the ice and pass off, so that you can keep milk, cream, butter, fruits and meats all in the same chamber without danger of injuring the flavor of either. The atmosphere of the room is always dry, sweet and pure.

"I should have explained before that the ice does not rest directly on the joists; but there is a bed of oak lath, about $1\frac{1}{2}$ by 3 inches, laid across the joists, about 4 or 5 inches apart, on which the ice is laid. I would farther suggest that another cold chamber can as well be had by making a cellar under the one shown, with a lattice floor between them. It would be necessary to finish the sides and bottom of this cellar in the

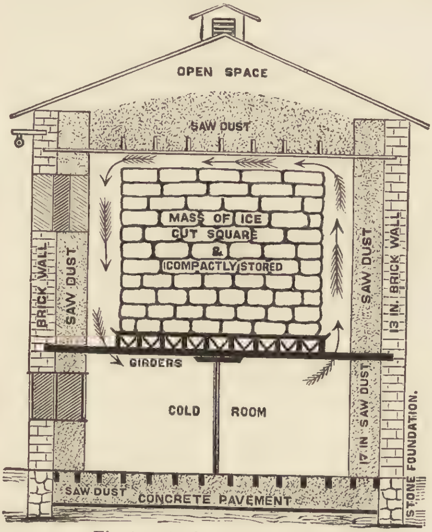

Fig. 64.—*Refrigerating House.*

most complete manner, as above described. At the entrance to the store-room there must be a vestibule, either inside or outside, as space or circumstances may direct. If outside, the walls should be thick and the door very heavy. The doors, both inside and outside, should be fitted with rubber, so as to close perfectly tight, and both doors must never be opened at the same time. This vestibule should be large enough to contain a fair wagon load of goods, so that if you are receiving a load of stuff, you are not required to stop until all is in the vestibule and ready to store. This house only needs filling once a year. The temperature will range from 34° in winter, to 36° in summer, and will preserve fruit perfectly from season to season. The opening for putting in the ice, shown just under the pulley in the cut, (fig. 64,) has two doors, with a

space between; each door a foot thick. The window in the cold room has three sets of sash, well packed or cemented. The walls are 13 inches thick, lined with 17 inches of sawdust. Thirty-six inches of sawdust are put on the floor over the ice. The building shown is 25 feet square, inside measure, and 22 feet from floor of cold room to ceiling over the ice. The ice-room is 12 feet high, and the cold room 9 feet. Pillars are required under the centre of the ice."

In writing to us subsequently, Mr. Taylor makes the following additional remarks:

"The important principles in its construction are *ample* protection from the outside influences (heat, air and moisture) and the ice so arranged that the air of the chill room can circulate *around and over it*, and the floor of the ice loft so tight that no water can possibly drop below. The advantage of condensing the *heat*, *moisture* and *flavors* of the chill room directly on the ice, as in this plan, instead of on an iron floor, as in nearly all other plans, is that the ice (four sides and top) furnishes a larger condensing space, and the ice will do it more rapidly and completely than the iron floor—consequently you have a dry, sweet room. There are two houses built here that have iron floors, made in shape of one large trough. The moisture condenses on the iron, runs down, and is carried off by the small underhanging trough. There is no communication between the store-room and the ice above. They put the sawdust immediately on the ice—say about 3 feet of it—and have a circulation of air over the sawdust, as the sides of the house are about 3 feet thick.* They keep ice very well, but they do not get quite as low a temperature, nor as good, dry, sweet air in the chill room."

A Gate which Cannot be Left Open.—A gate which is frequently passed by one person is often left open by the careless, to the annoyance of the farmer—such for example as the small gate to his cattle yard. The accompanying plan (fig. 65) shows how such a gate may be made, which cannot be left open, and which never needs fastening: *a a* is the fence; *b*, the gate post, in which the hinges are inserted; *c c c*, three posts set so that the fence has a **V** shaped opening; *d*, the gate, which will swing in this **V**. When any one wishes to pass through, all he has to do is to push the gate, step into the **V**, throw the gate back, and pass on. This is done with no trouble, in less than a second. No farm animal can pass it, and no latching or fastening is necessary. We find it exceedingly convenient.

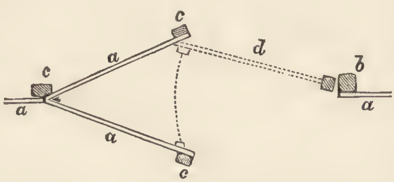

Fig. 65.

* We think so thick a stratum as three feet or thirty inches unnecessary, and that half that thickness will answer as well.

A COMPLETE FARM RESIDENCE.

WE HAVE FREQUENTLY GIVEN DESIGNS for the cheaper class of farm houses in former volumes of RURAL AFFAIRS, and now furnish a more perfect country dwelling in the plan of the residence of DAVIS COSSITT of Onondaga, N. Y., constructed during the summer and winter of 1877. The house was constructed under the immediate supervision of Mr. Cossitt, the mechanics working by the day, and every detail was carefully worked out and put upon the plans, and hardly a change was made during the construction. Wood was selected in preference to either brick or stone, though either could have been procured at moderate prices, and of excellent quality, in the immediate vicinity. But wood was thought to be the best for health. The studs, joists, and all timber two inches thick and over, had been seasoned four years, and most of the other lumber had a like seasoning. The outer inch boarding was so closely matched that when forced together, the joints were tight, and an intermediate lathing and plastering divided the six-inch space between the outside boarding and the inner faces of the studs into two air-chambers; the inside face of the studs being covered with inch boards, edge to edge. On this close boarding, vertical strips of one inch thickness were nailed, and on these strips the lathing was placed.

This wall, so divided into air-chambers, closed at top and bottom, that there may be *no change* of air, bringing in moisture and cold, is expected to give the warmest house in winter, and the coolest in summer, that can be made at any reasonable cost. Diagonal bracing between the studding

of the main partitions and bridging was extensively resorted to in order to make the frame solid.

The house is warmed by a furnace of full capacity to give pure air from outside the house, heating and sending it wherever wanted on both floors- Ventilation is secured by having flues in the walls, extending from the base boards near the floor to the top of the house, and in the large parlor used as the family living room, a grate not only gives ventilation, but a fire to look at when wanted.

Drainage of the house and cellar is secured by tiles that go around the outside of the cellar walls, some inches below their foundations. Under the cellar bottom, drains of 2-inch tile concentrate any water that might rise, and by proper descent carry it all far away from the house.

There are two cesspools—one for the drainage of the kitchen refuse, the other for the water-closets. The cellar is eight feet between joists, Its floor is covered by cement; its ceiling is matched boards, nailed on the joists, and several inches of mortar on this ceiling, between the joists, not only *deaden* the floor of the rooms above, but cut off any possible exhalations from the cellar. Division walls of bricks divide the cellar into convenient rooms, and windows hung on hinges light and ventilate it.

The accompanying plans, figs. 67 and 68, need but little explanation. The visitor on entering through the vestibule sees a spacious entrance hall, the large panel mirror at *M*, fig. 66, giving the appearance of its full breadth throughout.

The side entrance is under a veranda, and is used for a waiting and business room, at the same time furnishing conveniences for washing, for umbrellas, overcoats, overshoes, &c. The adjoining closets, for robes, brooms, &c., are readily accessible from this entrance. These closets, taken from the space otherwise allotted to the pantry, without abridging the space for pantry shelves, actually improve them by bringing them nearer the centre, and making them therefore more convenient for use.

There are no winding stairs in this house. When corners are to be turned, they are turned on square platforms. The main flight, standing in a recess between the front room and the dining-room, rises about eight feet, then a platform about eight feet long by three and a half feet wide, makes the half turn to the remainder of the flight. Over this platform is an oriel window that lights the stairs, as well as the back end of the lower hall, and the upper hall, and gives facilities for admitting air and sunshine. Under this main flight are stairs that lead to the cellar, and under the stair platform is the store-room opening into the dining-room.

The outside finish is adapted in some degree to the present prevailing architectural tastes, having an observatory, some more gables than were really necessary for anything but appearances, but which give a high and well lighted garret. The roof is of tin; the cornices wide, and the house

set three feet above the ground. Water from a large tank in the garret is carried, hot and cold, wherever wanted in the house, for all purposes

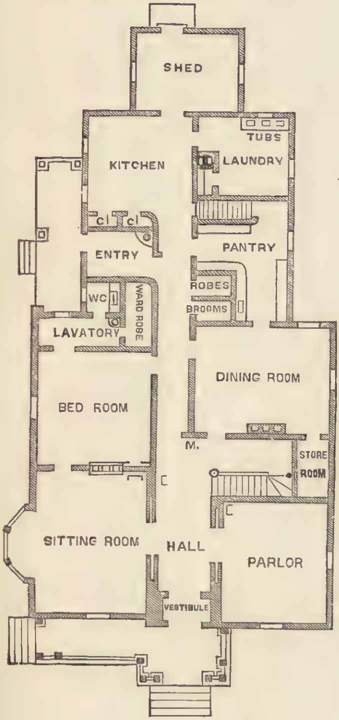

Fig. 67.—*Principal Floor.*

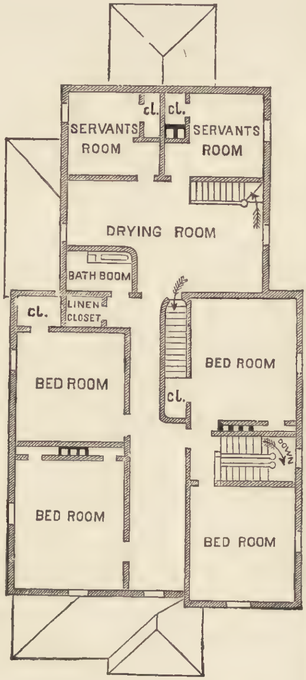

Fig. 68.—*Chamber Floor.*

except drinking and cooking. For these purposes a cistern under the room used for fuel, having a brick filter, gives a supply.

This house cost $8,000, besides the services of the owner, he giving most of his time to gathering materials and supervising the work for about a year.

Losing Scratch-Awls.—Every carpenter has had to hunt among chips or shavings for his scratch-awl. He may be saved much time by attaching to the end of the handle a small piece of bright red cloth, which will render it quickly visible anywhere. The same thing may be adopted by the farmer for any of his small tools, likely to be lost among straw or elsewhere.

SUGGESTIONS IN RURAL ECONOMY.

Culture of Indian Corn.

A condensed report was given in the Country Gentleman of a lecture on the culture of Indian corn by Prof. I. P. Roberts of Cornell University, at a Farmers' Meeting in Ithaca, in March, 1877, from which we make the following extracts:

Prof. Roberts gave an extended and valuable discourse on this crop, which he regarded as one of great importance, taking the place of turnips, so essential in British husbandry, and yielding annually in this country a billion bushels, worth half a billion dollars. In culture it is valuable as a hoed crop in rotation for clearing out weeds. A serious loss and drawback has resulted from the common error that it is a crop requiring little skill, and from this cause there has been a diminution in quantity in some localities, and the product per acre is much less than might be easily reached under proper management.

Very early planting is not to be recommended, as the seeds fail to grow if after planting they are kept for a considerable length of time at a temperature below 55°, but the temperature may be much lower for a short time. In the preparation of the soil, autumn and spring plowing each have their special advantages. Fall plowing admits of greater depth of working, and of more thorough pulverization before planting. Spring plowing, which should be shallow, allows the grass and clover to continue growing till near planting time, and to permit a larger quantity of vegetable food for the plants. If the plowing is done early in September or late in May, the cut-worm is partly eluded. Prof. R. urged the importance of thorough mechanical division or pulverization of the soil. If clods are broken into small fragments, these present a much greater surface to the action of the roots in withdrawing nourishment from the soil. To illustrate this truth, he cut an apple into a 2-inch cube, when it presented 24 square inches of surface. Cutting it into 8-inch cubes, the surface is doubled, and its surfaces are 48 square inches. Reducing the cubes to quarter inch, and we have 96 square inches of surface. In the same way the pulverization of clods increases the chances for the fibrous roots to receive supplies from all parts of the soil.

Planting.—If early, it should be shallow, and deeper for later planting and in drier soil. Surface harrowing, before the plants are up, destroys the starting weeds, saves labor and advances the crop. The roller is sometimes used in preparing the soil, but much care is needed, as more injury than benefit is often done when the soil is not in proper condition. No implement, said Prof. R., requires so much judgment in its use as the roller. For cultivating the rows, the two-horse cultivator should be be used for saving labor; a one-horse implement is too slow in its work

where the labor of a man is so valuable. A very common mistake is made in not cultivating at nearly equal intervals of time. Oftener than once a week is not desirable, and is liable to do injury, and it should not be deferred longer than ten days. The accompanying diagram (fig. 69) will show how these unequal periods occur. The square may represent a forty-acre lot; the cultivation is commenced at the side *a*, in the rows represented by the dotted lines. In the course of a week or two the cultivation is completed to *b*. The cross-cultivation is then begun on the side *c*, as shown by the continuous lines. A part of the field, as at *d*, is thus cultivated within a day or two of the previous work, and it thus goes on until that part of the field at *e* does not receive a second stirring till the entire interval of time has elapsed during the whole of the two dressings—half a month or more.

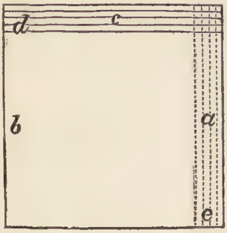

Fig. 69.

Protecting the Seed.—The old remedy of coating with tar was recommended as the best and easiest remedy for the wire-worm and crow. The seed is first made warm, not hot, with water, the tar applied and stirred, and it is then rolled in plaster and ashes. This treatment will slightly retard the germination. It should not be used when the soil is very dry. It does not kill the wire worm, but only repels it. The wire worm lives five years, and changes its skin three times during this period. It then retires from business for a short time, and comes out a snap-beetle to propagate its species. Good enriching culture, in connection with rotation, tends to reduce its numbers.

The brown cut worm (sometimes confounded with the white grub) is strictly a caterpillar, and after it has completed the usual transformations under ground, comes out a moth or miller. The only effectual remedy for it is to dig out and destroy it by hand.

A mistaken mode of plowing or cultivating corn to the injury of the roots was pointed out by diagrams on the blackboard. It is common to begin the cultivating at a distance from the small plants in the row, and go nearer afterwards as the stalks become larger and better able to withstand the banking of the earth. The young roots are not touched at the first cultivating, as shown in fig. 70. At the second dressing, a number of them are cut, and the plant is still more mutilated the third time, fig. 71. A better way would be to begin near the row, (which should be perfectly straight to permit it,) when little injury would be done while the roots were small and short,


Fig. 70.


Fig. 71.

and which would induce a more downward growth (fig. 72.) The subsequent dressings should be farther off, and would not reach or tear the roots (fig. 73.)

Fig. 73.

Prof. R. furnished the results of some of the experiments made on the grounds of the university, with different modes of treatment and different fertilizers. With three, four and five stalks to the hill, the following results were obtained: Three stalks gave 5,146 pounds per acre; four stalks gave 5,946 pounds per acre, and five stalks gave 6,160 pounds per acre. That is, with the four stalks to the hill the field yielded 800 pounds more to the acre than with three; and with five stalks, there was an increase of only 214 pounds per acre, showing that at four stalks the proper number was nearly, but not quite reached. The weight was taken at husking time, and seventy pounds of ears were reckoned as equal to a bushel of shelled grain. After several months of drying, it would of course be much reduced.

Fig. 72.

Burying Fodder.

Much inquiry having been made for information on the mode of preserving green fodder, known as *ensilage*, we give in condensed form the statement of Prof. Caldwell of Cornell University, which comprises the essential requisites for this mode of preservation:

This mode of packing green fodder in pits or trenches, requires that it may be made as solid as possible, and then covered with earth. It undergoes a fermentation, is softened in texture, so that the hard stalks become capable of being easily eaten; and, in fact, the process is not unlike that by which sourkrout is made. It is absolutely essential that the ground selected for the trenches has a perfect drainage, as water would spoil the result. The covering with compact earth should be a foot and a half to two feet thick, and packed solid to exclude air. The usual mode is to dig trenches two or three feet deep; but if there is any fear that the subsoil will be wet, the fodder is placed on the surface, and covered somewhat like a potato heap, but is oblong instead of circular. Fig. 74 is a cross section of such a heap, showing the chopped fodder within, and the earth covering over it. If well secured, this sourkrout fodder will continue uninjured for months, or even for a year. The fodder is cut rather short, so as to favor solid packing, and mixed with a portion of straw. The heaps may

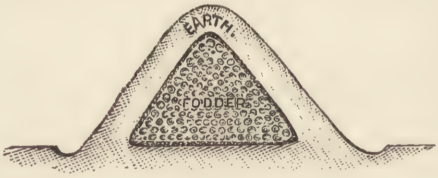

Fig. 74.

be made six feet high, and fifteen feet, more or less, in length, according to the quantity to be preserved. Straw is then placed over the heap, and the earth is added. This, if properly spaded up, will leave a trench all around the heap to facilitate drainage. Trenches are better, in that they require less labor to cover. A section of one of these is shown by fig. 75, and may be two and a half to three feet below the surface, six to eight feet wide, and about the same in entire height. Some persons use no straw, in which case it is necessary that the fodder be allowed to become partly dried. Others do not cut the fodder short, but in this case it is more difficult to tread it down compactly. Some add salt. It is important in any case to press or tread the fodder as compactly as possible, without leaving any interstices or air-spaces.

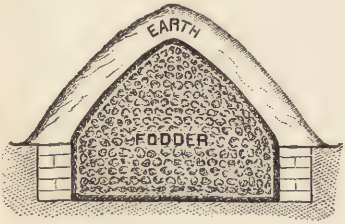

Fig. 75.

The total cost of the entire operation is reported not to exceed 24 to 30 cents per ton; or, including fodder and all, with one-fifth straw, $3.20 per ton, except covering

Fermentation always sets in; it could not be otherwise; but this is kept within bounds by the moderate bulk of the heaps, its coolness by contact with earth, and by the entire exclusion of external air.

The changes that take place are that the fodder becomes more digestible and slightly acrid, and if cattle dislike it at first, they soon learn to eat it greedily. If fed at the rate of 20 pounds to 1,000 pounds of live weight of animal, it does not affect the flavor of the milk in the least; 40 pounds of ensilage fodder and 10 pounds of meal are good feed for such an animal for a day, and 50 pounds have been given without any harm. The practice is especially recommended for adoption in this country, where cornfodder is more easily raised than roots.

When used, an opening is made at one end of the heap, and it is gradually used, working towards the other end. It spoils in a day or two when exposed to the air, and for this reason no more should be shoveled out than is needed for a feeding, when the hole should be covered with a thick layer of straw trodden down.

No attempt should be made to imitate this process by packing green hay in tight barns. There could not be exclusion from air, the fodder would not be kept cool by proximity to the earth, and the mass would be too large for safety.

Removing Large Trees.

G. W. Farlee describes in the Country Gentleman the following mode he successfully adopted in removing large trees: A heavily built

ox-cart had been constructed of wide tread, say 7 feet, and on the axle was built a gallows or bench 3 feet high and 4 feet long (of oak), about 8 inches square. On the top of this was strapped a stout canvas cushion, to protect the bark of the tree that was to lie on it (fig. 76.) Two men supplied all the manual aid required. Could machinery be more simple? Yet we find its work effective. The time selected is the early spring, when the frost is out of the ground and the buds begin to swell, but before the bark will readily peel. If left till the bark is fit for peeling, it is difficult to handle the trees without bursting the bark, and thus defacing and injuring them.

A circular trench is first dug around the tree, a foot or eighteen inches in depth, and six to nine feet in diameter, depending upon the size of the tree. The object of this is not only to get a ball of earth to accompany the tree with the intertwining roots it contains, but also to

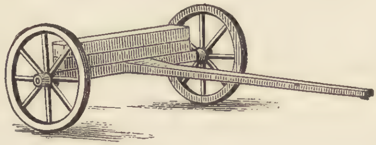

Fig. 76.

Fig. 77.

reach and cut off the four or five large lateral roots which now serve but little purpose other than keep the tree erect. These found and cut, removal is comparatively easy. To the end of the pole of the cart are attached two ox-chains, somewhat longer than the pole, and with hooks at the ends. The cart is now backed up to the tree, the pole elevated and carried up the tree, and the end lashed securely to the trunk, taking care to protect against rubbing, by the use of pieces of old carpet or canvas. The saddle or cross-piece of the bench now rests against the base of the trunk (fig. 77); the ox-chains suspended from the pole are then attached by their hooks to two large roots, and the tree is ready for the application of the power necessary to its removal. The block and fall, consisting of a long, stout rope, with two double pulleys, are now brought into requisition. One of the pulleys is attached to the end of the pole, and the other to a tree, or some other firm object, at a distance, to get sufficient leverage; the oxen are hitched to the end of the rope, and pulling steadily, the tree is lifted bodily, the action at the same time bringing the pole of the cart to its proper level, and the tree lies with its trunk upon the bench, and its top in a line with and on the pole. The top is now compressed into a small compass, by being bound tightly with

a half-inch rope, and securely fastened to the cart, (fig. 78.) The oxen resume their proper place at the pole, and walk off with the top of the tree extending beyond their heads, like a long, slender pyramid. The tree is balanced into position by the removal of earth from the roots if

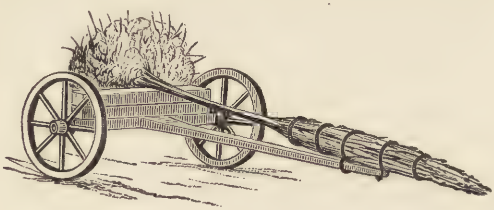

Fig. 78.

necessary. The hole for the reception of the tree is prepared beforehand, being about one foot in depth, and one foot wider than the ball of earth, that there may be space for filling with good soil, sods or well decomposed compost, *not* fresh manure, around the edge, that the broken roots may find good food for forming new rootlets. The cart is backed up to the hole, the oxen removed, and by the aid of ropes to guide it, the pole with the tree attached is once more elevated, and the tree brought to an erect position. It is then unbound and released from the cart, and with the aid of the oxen and chains hooked to the large roots, adjusted to its place. The trees should be supported or guyed with wires fastened to stout stakes driven into the ground, since if allowed to be rocked by the winds, the new roots that are forming will be broken, and recovery of vigor be delayed. My trees, the year of removal, developed leaves of about one-half the natural size; the next year they showed a new growth of about four inches on the smaller limbs, with the foliage nearly full, and the third year burst forth in full bloom, with, if possible, greater luxuriance than they had ever known before, and have since flourished with uninterrupted growth. Trees of six to seven inches in diameter could be readily removed by the use of the common ox cart with two hewn logs eight inches square lashed one above the other, to the axle, to serve as a bench on which to carry the tree.

Lubricating Gates.—Every gate on the farm should have the hinges and latches oiled or greased as often as once a month, varying with its use. Bore a hole in the gate post, insert a piece of lard or tallow, and plug it up. Whenever the hinges need it, the grease is always at hand. Without this provision, the work will be sure to be neglected. Within the house, as often as once a week, touch every door latch or bolt with a drop of kerosene, or with lard or tallow, and they will work freely.

IMPROVED FARM MACHINERY.

THE PAST TWENTY-FIVE YEARS have witnessed extraordinary improvements in the implements and machines for performing farm labor. The magnitude and importance of the results which have sprung from these improvements, have had no parallel in the history of man. A single machine—the mower and reaper—furnishes a remarkable example. During the three years preceding the late civil war, their manufacture had increased so much in numbers that when the war broke out there were enough in the field to save or do the work of nine hundred thousand men. Had the war occurred three years sooner, the withdrawal of nearly a million laborers from the farms of the north to fill the ranks of the armies, must have resulted in extensive ruin among the farmers. Since that period the number and efficiency of mowers and reapers have greatly increased, and there are now manufactured about one hundred and fifty thousand annually, which sell for more than twelve million dollars.

Among other improved machines, are the steel and hardened cast-iron plows, seed drills, pulverizing harrows, seed planters, steel-tooth rakes, horse-forks, hay-loaders, hay-carriers, self-rakers and self-binders on reaping machines; threshers, separators and stackers driven by tread powers, lever powers and farm steam engines; feed cutters and feed grinders, and farm wind-mills. We have not the data to furnish an estimate of the number of these machines in use, or of the amount of manual labor which they save; but if farmers generally could be thrown back for a moment on the use of wooden mould-board plows for inverting their soil, or the hand planting of seed, the scythe and cradle for cutting crops, tbe hand-flail for threshing grain, and on the other slow operations of former years, the impression would become vivid that a great revolution had been effected in the saving of hard work on the farm. But the saving of labor merely is by no means the whole benefit that results from these facilities. The farmer is enabled to perform his work so much more rapidly that heavy losses are often prevented. The mower and reaper enable him to cut his crops promptly in their right season; the hay tedder dries his hay, and the horse-rake, hay loader and horse-fork may save it in the best condition in the face of advancing storms. The ready preparation of his grain for market may enable him to take advantage of prices, or to place his crops in the purchaser's hands at the best or most convenient season of the year.

Importance of Good Workmanship.

The *form* in the construction of mowers, reapers, and other farm machines, important in itself, would be of little avail unless made in the best manner, and of the best materials. Two different manufacturers have worked on the same invention; one has succeeded in making a perfect

and durable piece of workmanship; the other machine, externally the same, by the use of bad iron, poor wood, and not being adjusted and fitted in all the parts, runs with difficulty, performs poor work, and soon wears out. The most successful manufacturers are those who have not only secured the best inventions, but have shown skill in construction, and made machines which have lasted and done heavy work for a long series of years.

Care of Machines.

The farmer must not only secure a good machine, but take proper care of it as long as he uses it. Protecting from rain and weather is of vital importance. With the wood cracked by exposure, or the metal rusted with rains, no machine can run easily or do good work, or last long. Dust and dirt cause the boxes to wear rapidly, and early repairs are required. Leaving bolts loose or unscrewed, occasions breakages. The man who has charge of a mower or reaper should frequently examine it, wrench in hand. He should keep all parts properly oiled which need it, taking care to apply a very small quantity at a time. If journals become "gummed," clean them with a rag dipped in kerosene, after taking them apart.

All machines not in actual use should be kept under cover. The wooden portions, if not thoroughly painted, should receive a coat of crude petroleum, which enters the pores and makes the wood durable. Machines which have not received the care required in the different ways mentioned, have been destroyed in a single year. With proper management they have lasted twenty years, with little repair.

Smooth Fields Necessary.—The more general introduction of farm machinery renders an important service to successful farming by compelling owners to remove the stones, stumps, and other obstructions to free working, and to drain the wet portions of their fields, that all may be alike subjected to easy tillage.

The Best Machines to be Chosen.

The great importance and advantages of using the best and most improved implements and machines, will be seen when an enumeration is made of the requirements on every well managed farm, even if only a hundred acres in extent. For such a farm the cost of the plows, subsoilers, cultivators, harrows, seed planters, grain drill, mower and reaper, horse-rake, fanning mills, farm wagons, forks, ladders, &c., will amount to many hundred dollars; and the aggregate for the six million farmers of the Union, ought not to be less than a thousand million dollars, if they are properly furnished. To obtain the best success in farm management, the farmer could not engage in a more profitable inquiry than to ascertain which of the various machines and tools are among the best that are to be obtained.

To assist this inquiry is the object of this article. Where a number of

manufacturers make the same machine, it often happens that each one possesses some particular point of superiority over the others; but it is interesting to know that for general use there is much less difference in their merits, taken as a whole, than a limited trial may induce owners and purchasers to suppose. Throughout various portions of the Union, there are manufacturers of excellent implements and machines; and as a general practice it is better for farmers to procure them near home, when equally good, either directly of the makers or of their established agencies, where repairs can be more easily obtained. For the same reason, well established manufacturers are to be preferred to transient ones.

This article, while aiming to offer much useful information, does not claim to be a complete treatise, or to describe all the valuable labor-saving machines of the farm, or to enumerate all the reliable manufacturers. This would occupy more space than we could devote to the subject. Nor does it aim to state which is best among the many competing machines offered in market. Much depends on the excellence of the material used and on the skill employed in the manufacture, and often still more on experience and care on the part of the farmer who uses them.

It is hoped that a more general introduction of valuable labor-saving inventions through the information given in this article, will benefit alike the farmer and the manufacturer.

Improved Implements for Tillage.

The simplicity of the plow in construction and in working has placed it at the head of all implements for inverting and pulverizing the soil. More complex and more costly spading or digging machines have been made, but their compound character has rendered them liable to get out of order, and their expense has prevented their introduction. On soils free from obstructions, some of them succeeded for a time; but when one out of their many parts becomes deranged or bent by striking a stone, they cease to work freely and are thrown aside.

The form of the plow has not been much improved of late years, but important advantages have been secured by the use of hardened iron and steel for the cutting edge and for the mould-board. The two principal sources of resistance as the plow moves through the soil are the friction of the bottom and sides, and the resistance against the cutting edge. Experiments in this country and in England have shown the friction to be about 35 per cent. of the whole force of draught, and 55 per cent., or over one-half, is consumed in cutting the earth. The remaining 10 per cent. is required for lifting and turning the furrow-slice. Hence it will be seen that for reducing the draught these two great requisites are best secured by employing a metal that will maintain a sharp edge, and that will occasion little friction on the mould-board and sole. For this purpose steel was at first used, and

the steel plows have the advantages of lightness, and of scouring in adhesive soils. They are still made and used, but have been replaced to a considerable extent by the *chilled* plows and those made of other hardened preparations of cast-iron.

It is proper to remark that in estimating the relative force required in a team to overcome the friction of the plow and the resistance to the cutting edge, the results will vary much with the friable or the plastic character of the soil, the sharpness at the time, and the hardness and polish of the share and mould-board. A fair average is given in the preceding estimate.

CHILLED PLOWS.—The practice of hardening the points of cast shares by chilling has long been known to manufacturers. More recently it has been applied, with important modifications and improvements, to the mould-boards. The well known process of chilling consisted in running the melted metal against a surface of cold iron. This process, while it greatly increased the hardness, rendered the metal correspondingly brittle. Various means for annealing have been employed to prevent this defect. Later improvements secure entire hardness to the metal throughout, as in the "carbon," "diamond" and "adamant" plows. The New York Plow Company inform us that the result of long experiment has taught them that "steel in a certain condition will mix with melted pig-iron, and with the addition of certain chemicals will make a homogeneous casting, by pouring into moulds, uniformly at the right time by means of its color when melted. This color line is very important, and is perfectly reliable. In this way we get hardness, uniformity and strength."

In former years, plows made of common cast-iron were sold rough, and the farmer employed all his skill in making them scour bright. Now, all plows are ground and sufficiently polished before being placed in market. Farmers who use them should take pains to keep them bright when not in use, with tallow, wax or paint.

MANUFACTURERS OF PLOWS.

The New-York Plow Company (55 Beekman Street) make what they term "adamant plows," using for this purpose cast-iron rendered extremely hard by a process of their own, the mould-board being equally hard throughout. These plows have a reversible, self-sharpening slip point, which is easily changed, at little expense, as it becomes worn, fig. 79.

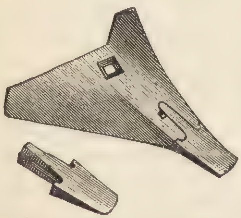

Fig. 79.—*Point of Adamant Plow.*

The Oliver Chilled Plow Works at South Bend, Indiana, are among the most extensive manufacturers in the country. The larger buildings which they occupy are the foundry, 165 by 300 feet; the grinding and polishing shops, each 50 by 200 feet;

the wood and paint shops, each of the same dimensions; and the storehouse, 40 by 900 feet. There are several other smaller buildings. A six-hundred horse-power engine drives the machinery, and several hundred men are employed. Over 70,000 plows are made in a year. The process by which the chilling is effected gives a uniform hardness through the whole of the mould-board. The beam is placed in the centre of work, removing side draught. The mould-board throws the furrow-slice upward and pulverizes it well before it is laid.

The chilled plow made by the Gale Manufacturing Company of Albion, Michigan, has a wide reputation for its good qualities.

The Remington Works, Ilion, N. Y., make many thousands annually of their "carbon plow," the share and mould-board of which are made of a cast metal of extreme hardness. This metal, they inform us, is made by melting a portion of cast-steel with common cast-iron and some other metals, the result by a particular process being a material not exceeded in hardness by any chilled process, while it has the advantage of uniform hardness throughout. The mould-boards receive a high polish.

The Wiard plow has been manufactured for seventy years, and during that time important improvements have been made. It has always given much satisfaction in the manner with which the furrow-slice is inverted, and by its durability. It is now made of chilled cast-iron, of several forms and sizes. The malleable beam is so constructed as to secure lightness, strength and durability—see cut, p. 132.

The Syracuse Chilled Plow Company make a plow not unlike the Wiard plow, which has a high reputation, and their manufacture is largely increasing.

Sulky Plows.—The Osborn Plow-Sulky, made by Gregg & Co., Trumansburgh, N. Y., is furnished with two wheels and a seat, (fig. 80,) on which the plowman rides, and, by the use of levers, readily controls the depth of the furrow and the width of the slice, the work being completely under his control. An important advantage is in lessening the friction on the sole in the furrow bottom. Any right-hand plow may be attached to the sulky. It has proved very successful in work, after several years' trial.

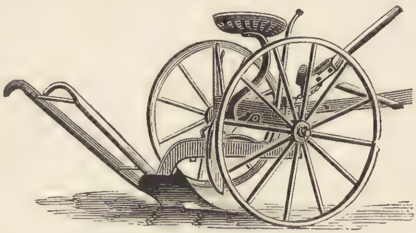
Fig. 80.—*Osborn Sulky Plow.*

The Casaday Sulky plow, similar in general principle, but differing in its details of construction, is made by the South Bend Iron Works, South Bend, Indiana.

An efficient sulky plow is made by Furst & Bradley of Chicago, which

has all the appliances for controlling the direction and depth of furrow by the man who rides or drives, and has some special advantages.

Another valuable one is manufactured by the Deere Company of Moline, Ill.

Form of Plows.

The brief space allotted to this article will not permit a discussion of the form of mould-boards and the other details necessary for good draught and efficient work. We give a few cuts of some of the best plows made in the country. Fig. 81 shows the form of the "carbon plow" made by the Remington Works at Ilion, N. Y. The mould-board and share possess extreme hardness, and the plow is a very durable one. Fig. 82 represents "Gregg's No. 3," made by Gregg & Co., Trumansburgh, N. Y., which, like the preceding, possesses hardness and durability. Fig. 83 is the "adamant plow" made by the New-York Plow Company, already mentioned.

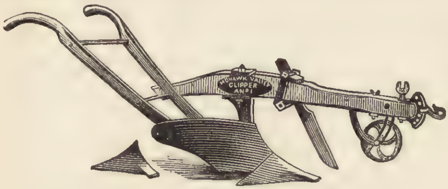

Fig. 81.—*Remington Carbon Plow.*

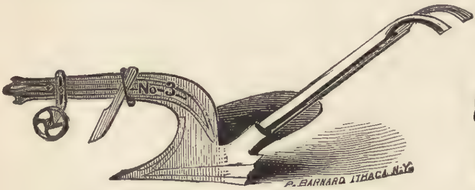

Fig. 82.—*Gregg's No. 3 Chilled Plow.*

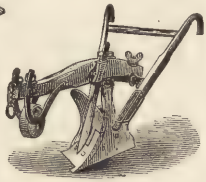

Fig. 83.—*Adamant Plow.*

Swivel Plows.—Plows so constructed as to turn the mould-board readily from one side to the other, termed side-hill, reversible or swivel plows, are of great convenience in plowing hill-sides, for throwing the furrow-slice always down hill, in passing horizontally backwards and forwards. Several inventions have been made for this purpose, having their several advantages.

Among the manufacturers of swivel plows are Belcher & Taylor of Chicopee Falls, Mass., who make three modifications or forms, as well as varying sizes. The Hubbel swivel plow is so constructed that the stationary cutter is always in a line with the point and landside, on whichever side the mould-board is thrown, and the clevis is always kept in the right position. The change is made at the end of each furrow with a slight movement by the plowman. Another form is the Hodge reversible plow, which has the advantage of being adjusted in different positions for

varying depth or width of furrow-slice. The change at the end of the furrow is made by a single touch of the foot. Another form is the "Oneonta Clipper," in which the shifting handles, moving on the centre of the beam, bring the coulter into position at each turn of the mould-board, and enable the plowman to walk in the furrow directly behind the plow. A touch of the foot changes the plow without taking the hands from the handles. Simpler and cheaper swivel plows, made by this firm, require more attention in effecting the change.

Swivel plows are often recommended for level land, to prevent dead furrows, the slice always being turned the same way. But after trial, most farmers prefer the lighter and simpler common plow for level fields.

Weed Hooks.—In plowing in green crops, it is common to attach a heavy chain in such a position that it sweeps over the tops of the growth, and brings the green mass under the mould-board. A hook is sometimes employed for the same purpose—see Rural Afeairs, vol. vi, page 250. One of the best is Ballard's "weed tucker," represented in the annexed cut, (fig. 84,) and which is screwed to the beam of the plow. Where weeds are permitted to reach a heavy growth on badly managed farms, this contrivance turns them completely beneath the plow, and where luxuriant crops of clover or cornstalks are inverted for enriching the land, the weed hook assists in making perfect work. It is manufactured by Scott Bro., Jay & Co., Fairmount, Ind., and sold for $3.50.

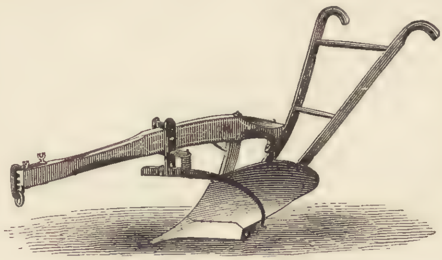

Fig. 84.—*Ballard's Weed Tucker.*

Harrows.

Spring-tooth Harrows.—These are made of the best steel teeth, about two inches wide, bent in a curve of the shape of the steel teeth of a hay-rake. When they strike a stone or other obstruction, they bend backwards and pass it, and immediately resume their former position, without checking the horses. They pulverize efficiently. Their constant motion prevents clogging. The teeth point forward and enter the ground easily. These harrows are intended to take the place of two-horse broadcast cultivators. They are made by G. B. Olin & Co. of Perry, N. Y.; the price varies from $25 to $37, according to size, for two or for three horses.

A spring-tooth harrow is also made by H. W. Luetkemeyer of Cleveland, Ohio.

Disc Harrows.—These consist of several wheels or discs made of steel plate, set on common axles, and running with slight obliquity to the

line of draft. They sink some inches into the soil, and moving it sidewise, produce pulverization. They have one important advantage over other harrows, in that these wheel-teeth roll through the soil without the the friction consequent on rubbing or scraping through it. They roll over obstructions without being caught by them. Their drawback is the want of the simplicity or oneness of other harrows, as they are composed of several parts. The lightest form of the disc harrow is La Dow's (fig. 85), which has also a flexible axle, and adapts itself to uneven ground, the wheel gangs being united by means of a series of joint boxes; the journals are protected from dirt and provided with self-feeding oil-cups, and the whole harrow is iron except the seat and pole. The weight of the driver, who rides, imparts efficiency to its work. These harrows are manufactured by Everett & Small of Boston, and by the Wheeler & Melick Company of Albany, N. Y., at $25. The last named firm makes one for cultivating corn, the wheels running in two spaces following the two horses which draw it. The discs may be set so as to throw the earth towards the corn or from it.

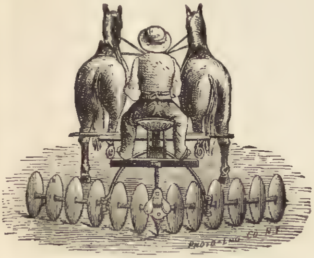

Fig. 85.—*La Dow's Harrow.*

Another form, known as the Randall harrow, has a stout timber frame, and possesses some advantages over the preceding in general efficiency in working, from its stiffness and weight. It is made by Belcher & Taylor of Chicopee Falls, Mass., and by the Warrior Mower Company of Little Falls, N. Y.

Shares' harrow operates in a manner similar to the disc harrows, and has the advantage of being all in one solid piece. The teeth slice the upper surface of the soil, and partly invert it like the mould-board of a plow. They press down at the same time the inverted surface of the sod, and do not tear it up. They pass over roots in an orchard without disturbing them. This harrow will pulverize about four inches of the surface. The steel teeth are much better than of cast-iron, but more expensive. It is made and sold by the Ilion Agricultural Works, New-York, and by Belcher & Taylor, Chicopee Falls, Mass.

The Thomas Smoothing harrow differs from all harrows previously made, in its numerous teeth, and in their backward slope at an angle of about forty degrees. The slope of the teeth causes them to clear obstructions, never to clog, and to pulverize finely the surface of plowed ground, destroying all small weeds at the surface. Larger weeds or plants are not injured by the passing teeth. Hence it is largely used for cultivating corn broadcast, destroying the small weeds, the teeth passing without injury among the young corn. The harrow being nine feet wide, many acres are harrowed in a day. But in its use the precaution is indis-

pensable, to harrow as often as once a week, till the plants are a foot high, so as to take the weeds before they are up an inch, grinding them to powder with the crumbled soil. A few days later they would escape. The frequent harrowing accelerates the growth of the corn. This implement may be used in the cultivation of potatoes while the plants are only a few inches high; but it cannot be adopted for turnips or carrots until they have grown several inches.

The greatest advantage is derived from its use in harrowing wheat in spring. The English practice of cultivating drilled wheat has been found to increase the product largely. The use of this harrow accomplishes the same end, with far less expense, for it may be used with a broadcast sweep of eight or nine feet at each passing, without any care to follow the drills. The first harrowing may be performed as early in spring as the ground will bear the horses; and it may be continued every few days till the wheat is a foot high. The increase in the wheat crop resulting from this harrowing has been found after many experiments to be from five to ten bushels per acre. At the last harrowing clover seed may be sown and lightly covered with the harrow. Timothy seed sown with the wheat the previous autumn will usually be several inches high in spring, and may be harrowed with positive benefit.

This harrow is used as an important labor-saver in pulverizing spread manure, the sloping teeth cutting downwards and grinding the manure, instead of pushing it forward, as with common vertical-tooth harrows.

Since its introduction several imitations have been made by adopting the slanting tooth; but as these are not set solid in the frame, they are liable to become soon deranged.* An engraving of this harrow may be seen on page 295 of vol. VI of RURAL AFFAIRS.

Apparatus for Planting Crops.

GRAIN DRILLS.—The general introduction of drills for sowing wheat and other seeds, throughout most of the northern States and portions of the southern, has resulted in great benefit to grain raising. They are more accurate in their work than hand-sowing, are more economical of seed, and give better crops than common broadcast sowing. They should be properly adjusted for use, for when the tubes have been set too deep, this has lessened the crop, and in a few instances caused a hasty rejection of the drill.

A great improvement has been made during late years in the accuracy and uniformity of the sowing. Instead of the old mode of allowing the seed to pass through the machine merely by its weight, the "*force feed*" is now employed, which carries it through with precision, and the amount per acre is accurately gauged. The prices of grain drills vary from $70 to $90.

* It is proper to inform the public that the inventor of this harrow and the writer of these remarks, has not been for many years in any way interested in their manufacture and sale, and does not make these remarks as an advertisement.

Among the many very excellent drills now mauufactured are the following:

The "Farmers' Friend" is the name of a drill made by the Farmers' Friend Manufacturing Company of Dayton, Ohio, which has been in operation nine years. It is adapted to sowing all grains and grass seed, and has an attachment for sowing fertilizers. Fig. 86 shows the "double force feed," by which an exact quantity of seed is carried down as it revolves. The quantity is regulated by the slower or more rapid motion

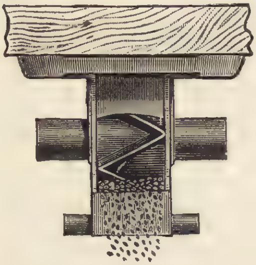

Fig. 86.—*Double Force Feed.*

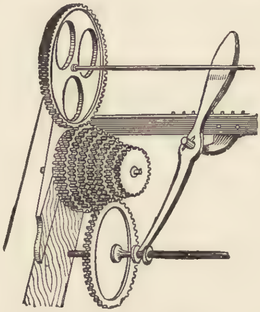

Fig. 87.—*Cone Gearing.*

of the feed shaft, which is effected by means of a cone of cog-wheels of different sizes for this purpose, (fig. 87,) and the amount discharged may be changed by a single movement of the driver, while the drill is in operation. An arrangement is connected with this drill by which the hoes are thrown backwards on striking a stone or stump and are immediately replaced, when the obstruction is passed, by means of a rubber spring.

Another seed-drill, made by J. W. Stoddard & Co., at Dayton, O., is termed the "Triumph." In this the quantity of seed is regulated by turning a screw at the end of the seed-hopper, which enlarges or diminishes the feed-wheels, the actual speed of these wheels always being the same. It has a grass-seeder, sowing any desired quantity per acre. It has also a land measurer, showing, by hands on a dial, the amount of land gone over, the large one making one revolution per acre, and the smaller one, the acres from one to twelve, only measuring while the drill is actually sowing. The hoes have a spring for throwing them again into position after passing an obstruction. This drill will sow fertilizers.

The well known "Buckeye" drill is made by P. P. Mast & Co. of Springfield, Ohio. It discharges seed in any desired quantity with accuracy, and has an arrangement for sowing fertilizers, the quantity of which is regulated the same whether dry, or damp and adhesive.

The "Farmer's Favorite" is one of the oldest and best seed-drills, and

has been widely used throughout the Union. It is very successful in its accurate delivery of the same amount of seed on hillsides as on level ground. It sows guano, phosphates and other fertilizers with the grain, as may be desired, whether damp and adhesive, or dry. A change in the quantity sown is effected by a change of cog gear, increasing it by increasing the rapidity of the stream, and not by altering the aperture. An engraving of this drill is shown on page 293 of vol. VI of RURAL AFFAIRS.

The "Empire" drill, made by H. L. & C. P. Brown of Shortsville, N. Y., has a high reputation for excellence, Its fertilizing attachment is divided into compartments, and the fertilizers may be run down alternate tubes between the seed tubes, in sowing drilled crops with wide spaces.

Foster & Aldrich of Palmyra, N. Y., have manufactured for many years a valuable and efficient drill, with arrangements for sowing fertilizers and grass seed.

Williams Brothers of Ithaca, N. Y., manufacture a plaster and broadcast grain sower, which may be attached to their horse-rake, or be a separate machine. The sower complete in itself is offered for $30; or as an attachment to the horse-rake, for $20. It has a double crank motion, driven by bevel gearing, with two sets of agitators, which keep the plaster or other fertilizer always loose in the hopper, and the throat open. It is successfully used for sowing all kinds of grain broadcast.

Ewald Over of Indianapolis, Ind., manufactures a one-horse wheat drill for sowing wheat in standing corn, consisting of a seed-box with a force feed driven by gearing, placed on a one-horse cultivator. It is made of two sizes, with three and five tubes. It may be used for general purposes on small farms. The price for the smaller is $20; for the larger, $25.

PLANTING CORN.—In clean fields, corn may be planted in drills, and cultivated in one direction only. Repeated experiments show that drills will afford about 25 per cent. more grain per acre than hills, and a still larger proportion of fodder. Even in fields foul with the seeds of weeds, drilling will answer well if the soil of the field is smooth and mellow, so as to allow the weekly use of the smoothing harrow, which will destroy all the weeds at little expense, as elsewhere explained. Drilling the seed instead of planting in hills by hand, effects a large saving of labor in planting. A common grain drill is used for this purpose, by employing only such tubes for the rows of the corn as are at proper distances. Fertilizers may be sown at the same time with no additional labor. With a drill having seed tubes 8 inches apart, the rows may be 40 or 48 inches apart; or with 7-inch drills the rows may be 35, 42 or 49 inches apart. No previous marking is required for the planting; and the rows being parallel, are easily cultivated.

When it becomes desirable to plant corn in hills, or in rows both ways in large fields, the Champion corn-planter, made by Beedle & Kelly, Troy, Ohio, will plant two rows at once. It is drawn by two horses, and a man drives, while a boy seated on the machine controls the dropping as each

marking is passed. This machine possesses the following advantages: By means of a lever, the depth in planting may be controlled while the machine is in operation; strict precision may be secured as well as ease in dropping, by the movement of the dropping lever; and accuracy in dropping is preserved, both in the line and in the number of grains. The price is $65.

TRUE'S POTATO PLANTER.—This is a useful machine where fields of several acres are to be planted. The seed potatoes are to be assorted, and those of nearly equal size put into the hopper at each operation. One at a time comes in contact with the slicing knife, which cuts the pieces, and they drop one by one through a tube, which at its lower end opens a furrow, into which each piece is dropped at a regular distance, visible to the eye of the operator. The earth falls on them, and the coverers bury them at a proper depth. The hopper holds about a bushel of potatoes. The knife cuts them at random, of equal sizes, and of such size and shape that it is nearly impossible for any piece to be without eyes. Gauge rings are provided next to the knife, by which potatoes of different sizes are planted separately. If the soil is uniformly mellow, from six to eight acres may be planted in a day with one horse, and a man to drive, the machine cutting, dropping and covering at one operation. An appendage may be attached for dropping fertilizers with the seed. These machines are made by Nash & Brothers, No. 7 College Place, New-York, and the cost varies from $30 to $40.

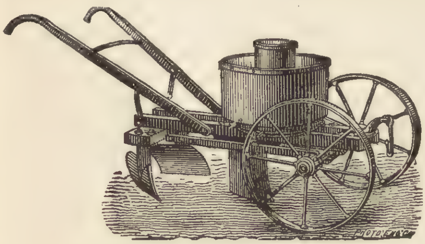

Fig. 88.—*True's Potato Planter.*

HAND PLANTERS.—Everett & Small of Boston offer in market an efficient and useful planter of garden and other seeds which are sown in drills. It opens the furrow, drops the seed evenly at the required depth, covers, and rolls the soil; at the same time marking the next row parallel to the one planted. Among the seeds to which this drill is fitted are beets, carrots, peas, beans, corn, sorghum, onion, parsnep, turnip, &c. An indicator has the names of these different seeds, and it is necessary only to turn the hopper to the name. There are no cams,

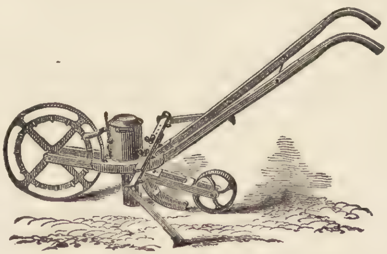

Fig. 89.—*Everett & Small's Planter.*

gears, springs or belts to get out of order, and yet the quantity of seed is accurately gauged. The price is $12.

Allen's "Planet Drill" has a cylindrical brass seed-hopper, which revolves with the wheels, insuring regular dropping, and is readily adapted to seeds of various sizes. It never clogs, and sows perfectly and evenly. It is made by S. L. Allen & Co., 119 South 4th Street, Philadelphia.

Cultivators.

Furst & Bradley of Chicago have carried on an extensive business for many years in the manufacture of agricultural machinery. During the busy season they employ from 450 to 500 hands, and can turn out each day 200 plows, 100 sulky rakes, 100 sulky cultivators, 50 sulky plows, besides hand barrows, field rollers, road scrapers, harrows, &c. The daily production is equal to that of 500 plows.. They manufacture largely the riding and walking cultivators for working among corn and other crops in rows. These cultivators are drawn by two horses, which walk in contiguous rows, and two spaces are cultivated at a time. This gives an important advantage over the use of one-horse cultivators. which equally require the labor of a man, with only half the amount of work accomplished. These machines are provided with reversible shovels, and they are easily controlled.

The Sandwich Manufacturing Company of Sandwich, Ill., makes an efficient walking cultivator, which works in two spaces, and is furnished with means for controlling the depth, or the right or left motion. It is readily changed to a riding cultivator.

Among the extensive manufacturers of farm machinery are P. P. Mast & Co. of Springfield, Ohio. This manufacturing company has a paid up capital of half a million dollars, and gives constant employment to 350 men. Among the machines made are the Buckeye grain drill, of which there are 50,000 in use; the Buckeye walking cultivator; the combined walking and riding cultivator, the sulky plow, and broadcast seeder.

Mowers and Reapers.

When, about twenty or thirty years ago, mowers and reapers began to be largely demanded and introduced, many persons commenced their manufacture, mostly on a moderate or small scale. Numerous defects were found in a large number of these, new difficulties occurred, and most of the manufacturers gave up the business. We have been furnished a list of one hundred and ninety of these unsuccessful manufacturers, in different parts of the country! The fact became established that to make the best machines, great skill and experience are required, with ability to procure the best material, to secure skilled workmen in the several departments, to make a systematic division of labor, and to provide, without regard to cost, the best machinery for forming the multifarious parts required for a complete mower and reaper. As a consequence, there are

fewer manufacturers at the present time, while their works are mostly conducted on a vast scale, and with systematic accuracy. The importance which this part of farm machinery holds at the present time in farm economy, calls for a somewhat detailed account of this interest, and for a notice of some of the more prominent manufactories employed in the construction of mowers and reapers.

Mowers and reapers are now made at much lower prices than ten or twelve years ago, partly because labor and material are cheaper, and partly because the patents on the many parts which make up a machine have mostly run out. An extensive and experienced manufacturer stated to the writer that he and a few companies with whom he had been associated in purchasing patent rights, had paid first and last over one million dollars for the privilege of using the many patented parts with which every machine was encumbered.*

Manufacturers incur much risk by the breakages to which their machines are liable when not made of full strength in every part. Long experience is required to meet all the requirements of a perfect mower or reaper. In one case the use of bars of iron slightly too small in making a certain part, cost an extensive manufacturer no less than $30,000 in broken, damaged and returned machines. Even careless handling by the farmer, the want of protection from the weather, or neglect in oiling the journals or in screwing up the bolts, may seriously injure the reputation of the best machine.

Good machines will reap about one acre per hour, for ordinary, every-day work, and ten acres a day may be regarded as a fair estimate, although with powerful teams and hard driving, nearly double that amount has been reached. Mowers cut nearly the same amount.

Adriance, Platt & Co. of Poughkeepsie, N. Y., have manufactured, for more than twenty years, the machine known as the Buckeye mower and reaper, which has proved, by long and extensive trial, both excellent and durable. They have made recent improvements, among which is a simple contrivance by which the driver throws the work in and out of gear by simply turning a button. The cog-work is simple, and is carried high above the ground. Side-draught is obviated by balancing the cutter on one side, with the weight of the gearing on the other. As with all machines which have the cutter-bar in front of the driving-wheel, with the driver's seat behind, an equilibrium is effected by which no weight rests on the horses' necks, and the driver has a full view of every part. The leading wheel in front of the knives prevents loose grass from being pushed along and clogging the knives, and prevents the finger guards from catching the ground when passing small elevations. The double-jointed coupling between the gearing and the cutter-bar, leaves the weight of this

* This would show that at least some inventors had been remunerated for their toil and hard thinking, were it not for the fact that most inventions of value are bought up cheaply by shrewd or scheming adventurers, or by good and reliable manufacturers who know how to make profitable bargains.

bar to its own support; all the rest of the machine rests on the driving-wheels, thus imparting efficiency to the motion of the knives. The cutting apparatus folds squarely over the machine, which is thus readily driven to any distance on the road (fig. 90.) A special contrivance gives to the cutter-bar its full length of cutting. These machines are strongly and neatly made, the mower weighing 600 lbs., the reaper between 700 and 800 lbs. Experiments have been made with lighter machines, but it is found that the weight here given is required for full and reliable strength. As now made they perform excellent work with little draught.

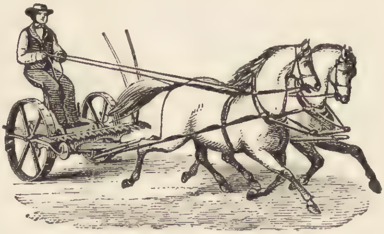

Fig. 90.—*Buckeye on the Road.*

Adriance, Platt & Co. have recently constructed a reaper which appears to possess important merits. The self-raker resembles the Johnston self-raker, with improvements. The ease with which the rakes operate enables the driver to control their operation with great ease, and like other rakes, the size of the gavel is regularly fixed, or its size determined every time by the driver by a pressure of the toe. A light touch of the heel causes the rake to pass without gathering. It is put in and out of gear by turning a button near the driver's hand. The platform of the reaper may be compactly folded for driving on the road. This reaper, as now made, proves one of the best in use (fig. 91.)

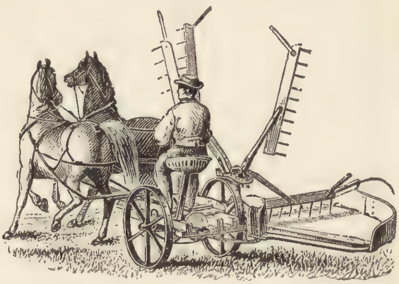

Fig. 91.—*Buckeye at Work.*

The machines of Messrs. Adriance, Platt & Co. have made successful trials in Germany, France, Holland, Sweden, Belgium, Russia, Italy and other countries.

Their manufactory is beautifully situated on the banks of the Hudson River, half a mile south of Poughkeepsie. Their main building is 50 by 300 feet, the interior of which is neatly and systematically arranged. The foundry is 50 by 200 feet, and there are several smaller buildings. They make from 7,000 to 9,000 mowers and reapers annually. The first four years they lost money while perfecting their work and introducing their machines, but have since been eminently successful. They informed us that some of their machines have been in use for twenty years, and are not yet worn out, having received the best care from the owners.

The distinctive characteristics of the Buckeye machines, made by this and other firms, consist in placing the cutter-bar forward of the two driving-wheels; in the double-jointed coupling between the gearing and the knives, giving a flexible cutter-bar; and in the lifting lever. The driving-wheels contain no cogs, but motion is imparted to the knives by fixing the driving wheels fast to the axle, which in revolving gives motion to the cutter. When not cutting, in driving from one field to another, or on the road, the wheels move independently of the axle, which, with the gearing, remains at rest. A similar contrivance is adopted in other mowers and reapers.

C. Aultman & Co. of Canton, Ohio, manufacture annually about 15,000 of the Buckeye mower and reaper, and have made it for twenty-two years. They turn out from 1,000 to 2,000 threshers, and have made them for twenty-five years. They commenced the manufacture of the Monitor engine in 1877 with one hundred, and made in 1878 two hundred and sixty.

The mowing machine which they term the "New Buckeye," is all iron or steel, except the tongue, and has the qualities of the Buckeye in the forward cut, insuring safety to the driver; in the lifting lever to raise the cutter-bar over obstructions; in the tilting lever to raise or depress the points of the guards; and in the perfect protection of the gearing. The Buckeye "dropper" is easily attached to this machine for reaping.

They manufactured 1,000 of their self-binders for the harvest of 1878. This is similar in its general form to other self-binders, and appears to have been very successful in its work.

Bradley & Co. of Syracuse, N. Y., manufacture yearly about 900 of the Buckeye mower and reaper, which have the reputation of being among the best.

The Champion reapers and mowers have a high reputation, and 35,000 and upwards are made by three firms at Springfield, Ohio. The manufacture was begun by Wm. H. Whiteley, the inventor, and the demand increased to such an extent that ultimately three companies engaged in the work, namely, the Champion Machine Company, whose territory for sales is the Southwestern and Southern States; Whiteley, Fassler & Kelly, who have the Eastern and a portion of the Middle States, and South America; and Warder, Mitchell & Co., who have the entire Northwest, the northern portion of Ohio, Indiana and Illinois, the western portion of New-York and Pennsylvania, the Pacific States and Europe. Their combined

Fig. 92.—*New Champion Reaper.*

capital, with two appended companies, is two million dollars; they employ 1,500 men, and one-fifth of the city of Springfield depends on this business for a living. They all manufacture the same machine, interchangeable in all its parts. They employ malleable iron largely in the construction of their mowers and reapers, and the three firms have united in establishing the Champion Malleable Iron Company, which turns out annually upwards of two hundred tons of malleable castings, used exclusively on these machines. On the same basis the Champion Bar and Knife Company was organized, the product being entirely consumed by the three manufactories. Their machines formerly had a rear cut, but in 1876 they commenced making the New Champion mower, with a front cut, which has been much approved.

Wilbur's Eureka mower is quite unlike all the others, in having the draught pole in the centre of the machine, and the cutting-bar between the two wheels directly following the team. One of the horses, as a consequence, walks on the uncut hay or grain. This is found in practice to be of little detriment, while the cut grass or grain is out of the reach of the horses' feet at the next passing. The peculiar form of the mower gives it some decided advantages, in lightness of draught, steadiness of operation, and broad swath. It also has the advantage of returning along the same line without going around the piece of grass. It is made by the Eureka Mower Company, Towanda, Pa., who manufacture about 600 yearly at the present time.

Among the best machines made in the Union are the mowers and reapers of D. M. Osborne & Co. of Auburn. N. Y. They manufacture over 12,000 annually, and employ, when at work, about 600 men, making themselves some of the parts usually purchased by other reaper makers. The self-raking attachment, partly an invention of their own, operates with much success. Among the several forms of mowers and reapers made by them is the new "Wheeler No. 6," a combined mower and reaper, which is remarkable for the perfect control it gives the driver in its work. For farms of moderate size, a combined mower and reaper is made, furnished with a "dropper," or simple apparatus for forming the cut grain into gavels without the use of the broad raking platform. Among the special

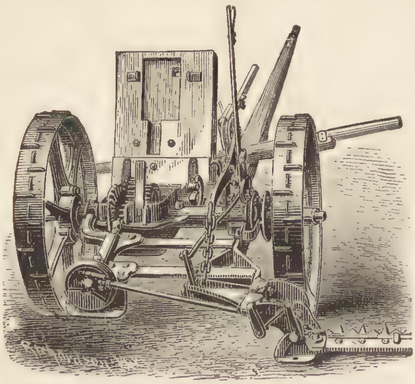

Fig. 93.—*Osborne Mower with Box turned up to show Gearing.*

merits of the No. 6 are named the following: A frame of wrought iron bars, strong enough to resist, as long as the machine lasts, all the pressure against the cutter-bar; an arrangement by which the knives are readily raised or lowered in passing over uneven ground, independently of the main frame; the perfect control of the position of the knives in cutting lodged grain; and the position of the self-raker for the most effective work.

The Osborne self-binder has been so perfected that it is one of the best now made, and the demand has been so great for it that 2,000 were sold for the harvest of 1878. In this self-binder, six rollers give motion to a carrying and elevating canvas, and a comparatively simple contrivance does the work of binding, twisting the wire, and discharging rapidly each successive sheaf.

D. M. Osborne & Co. have constructed their reapers so that for traveling on the road, or from field to field, the whole may be folded into a neat, compact shape only four feet wide, passing readily through narrow spaces. They have branch offices at Chicago, St. Louis, Dallas, Cleveland, Philadelphia, San Francisco, Liverpool, Paris and Bremen.

Wm. Anson Wood's mowers and reapers are made by the Eagle Mower and Reaper Company, at Albany, N. Y. This company has manufactured the Eagle mower and reaper for about four years, and during this time has secured a large business. They make about 8,000 machines in a year, and employ 250 men. Their main building is 75 by 200 feet. Their mowers weigh 625 pounds; their reapers 800 to 1,000 pounds. Among the special improvements which they have made is the patent chilled iron box for a bearing, and each being an exact duplicate of all the others, every machine works exactly alike, and these bearings do not wear out, The two wheels of the Eagle mower are separated by a rather long axle, giving steadiness to its motion. A pitman protector prevents injury to it on rough ground. A one-horse mower is made with thills. Their reapers, of two sizes, have modified self-rakers of nearly the usual form. Like most other reapers now made, their platform is folded for driving on the road. The cutter-bar is on a line with the axle. They make a combined mower and reaper. Trials of their machines with the dynamometer show a light draught.

The Remington Agricultural Works, at Ilion, Herkimer Co., N. Y., manufacture a large number of various agricultural implements and machines. Their main building is 300 feet long, 50 feet wide, and four stories high; their shovel manufactory is 200 feet long; their foundry 150 feet, and they employ here about 300 men. They turn out yearly 2,000 of the Crawford mower, and many thousands of their "carbon plow." They make annually 100 tons of cultivator teeth, and a large number of shovels. spades, steel-rakes, hay-forks, &c. They largely manufacture iron bridges. The spades and shovels are made of one piece of steel, without rivet or welding, the sheet being rolled back so as to form a socket for receiving

the wooden handle. They are thus strong, durable and simple in form. Their needle cotton gin is one of the best made in this country, and having witnessed its operation, we can speak with confidence of its perfect work in cleaning, the large quantity of lint obtained, and its rapid working. From the report of trials, it appears capable of ginning a 500-pound bale in less than an hour.

The Crawford mower is among the best made in the country, and the following merits are claimed for it by the makers:

"The gearing is so securely boxed as to keep it entirely free from dust, dirt and grit. The shafting is all firmly held by the frame, and consequently must always work in line, with equal friction on the bearings, until the machine is worn out. The machine is accurately balanced upon the driving-wheels, so that the horses' necks are entirely relieved from a heavy weight. By means of the lifting lever the cutter-bar can be folded or raised to pass any obstruction. With the tilting lever the height of cut can be changed either for cutting lodged grass (the way it is lodged) or over rough and stony ground. The draught-rod connecting the evener with the cutting apparatus, overcomes the side-draught, and lessens the draught of the machine. The seat for the driver answers a double purpose—as a tool-box and a seat combined. The gearing is changed by means of a lever worked by the foot of the driver, thus leaving his hands free. The driver can fold the bar, regulate the height of cut, shift the gearing, and oil the machine in all its parts, without getting off his seat."

The manufactory of the Walter A. Wood Mower and Reaper Company, at Hoosick Falls, N. Y., is the largest single reaper factory in the world. The visitor on approaching the buildings, is struck with their colossal size. The principal one is 150 feet wide and 400 feet long, with an addition of 150 by 70 feet. The foundry is 70 by 400 feet, and 40 tons of cast-iron are melted daily and cast into parts of machines; or 6,000 tons yearly. The blacksmith shop is 70 by 90 feet. From 700 to 1,100 men are employed to do the necessary work in making 25,000 mowers and reapers, the number manufactured the past year. Nearly all the work is done on one floor.

The large number sold annually proves the excellence of the machines. Among the various modifications are the improved iron mower for two horses, the mower for one horse, two sizes of the sweep-rake reaper, the mowing attachment for the reaper, the chain-rake reaper, and the self-binding harvester. The self-binder, in which wire is used for the bundles, has been so successful that 5,000 were made and sold for the harvest of 1878. A western farmer* used ten of these in 1876, and harvested with them, 1280 acres. In 1877 he bought thirty-one more, and harvested 7,500 acres of heavy grain. He states that the saving in clean work over hand-binding more than pays for the cost of the wire. The manufacturers give the following as among the leading points of excellence in this machine:

* Oliver Dalrymple of Minnesota.

"The machine is so balanced that when the driver is in his seat all weight is taken from the horses, and side-draught is entirely removed. The line of cut is nearly on a line with the axle of the main wheel—an important feature, and most desirable for crossing furrows or following irregularities of surface. The height of cut, by a very simple arrangement, can be quickly and easily changed. The driver, on a good, comfortable seat, has entire control of the machine. By the use of levers, conveniently located, the points of the guards can be elevated or depressed, and the knife and rakes thrown out of or into gear while in motion. All the gearing is where it can be reached, yet covered to protect from straws and dirt. The patent spring oilers are applied to all bearings. The sweep of the rakes is most perfect, delivering the cut grain well out of the way of the machine and horses. The balance of the machine is perfect, and the draught light and easy for two ordinary farm horses. The platform and cutting apparatus are so hinged to the main frame that they can be turned up for transport, and when so arranged the machine will pass through a gateway *five* feet in width."

The following are the merits of the self-binder: 1. A free separation of the bundles from the unbound straw in lodged or tangled grain. 2. Compressing the bundles with iron arms before binding, instead of drawing it together by the wire itself. 3. Tight binding in consequence of this compression. 4. Ready regulation by the driver of the size of the bundles, and the saving of wire in the use of large ones. 5. In the cleanness of the work, the horse-rake collecting no scatterings after the binder.

About one-third of all the machines made by this company, are sent to different countries in Europe.

The Johnston reaper, manufactured by the Johnston Harvester Company of Brockport, N. Y., at the rate of 2,000 or 3,000 annually, has within a few years acquired a high reputation, not only in this country, but in Europe, where it has had many successful trials. Among other points of merit, the following are mentioned: 1. Driver's seat balancing the pole. 2. Pitman rod attached to knife by ball and socket, giving elasticity. 3. Patent key-nuts, easily adjustable. 4. Speed of knife changed by reversible gear; and 5. General strength, durability and finish. The self-raking attachment on the reapers, consisting of the cam movement of the rakes, operates on the same general principle as those of most reaping machines. Fig. 94 represents this reaper. Mowers and reapers are made as separate machines,

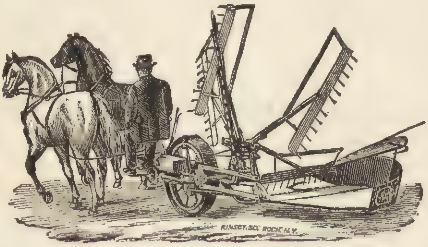

Fig. 94.—*Johnston Reaper.*

or the two combined in one. The separate reaper, as with most other manufacturers, has but one large or driving-wheel; the combined machine, as well as the mower, has two.

The Marsh harvester, as made many years ago, had a platform on which two men stood and were carried along with the machine. The cut grain was delivered on a platform before them. As they expended no time or strength in stooping and in passing from gavel to gavel, they could bind twice as fast as otherwise. This harvester, with some modification, is still manufactured, and among others as the Adams & French harvester, by the Sandwich Manufacturing Company, Sandwich, DeKalb Co., Ill. The only drawback with this contrivance is the increased weight of the binders. The same manufacturers also make a self-binder, which uses wire.

Gregg & Co. of Trumansburgh, N. Y., build annually about 1,500 mowing machines, 200 to 300 plow sulkies, about 500 chilled plows; and 700 lawn mowers in 1878, with the prospect of making 3,000 in 1879, as these lawn mowers are simple, cheap and efficient. The mower termed the "Meadow King" (fig. 95) has for several years proved itself one of the best. It is simple in construction, and is afforded to purchasers for $70. The manufactory employs over 100 men for these and some other machinery.

Fig. 95.—*Meadow King Mower on the Road.*

The Warrior Mower Company of Little Falls, N. Y., manufactures an excellent mowing machine, the cutter-bar of which, like that of many or most other machines, is in front of the wheels, where it is easily seen by the driver, and, like many others, has no cogs in the driving-wheels. The same company makes a one-horse mower with thills.

The Victor mower, made by the Cortland Foundry and Machine Company of Cortland, N. Y., has been much improved, and is highly esteemed by those who have used it, as a good and efficient machine.

Self-Binders.

It has been many years since the first attempts were made to bind the wheat cut by a self-raking reaper, by the use of wire. It is more recently that these efforts have proved practically successful. Among those who have succeeded, and who have, on the basis of this success, manufactured them largely, are D. M. Osborne & Co. of Auburn, N. Y.; the Walter A. Wood Company of Hoosick Falls, N. Y.; McCormick & Co. of Chicago; the Sandwich Manufacturing Company of DeKalb, Ill., and the Johnston Harvester Company of Brockport, N. Y.

The accompanying cut (fig. 96) represents the self-binder of D. M. Osborne & Co. in operation. The grain on the platform at the left being carried up and over to the right, where it is bound and discharged, only one man is required, as driver.

Fig. 96.—*Osborne Self-Binder in Operation.*

The Johnston Harvester Company have recently completed a contrivance by which strong hemp cord is used instead of wire, obviating the objection of the wire becoming mixed with the straw at threshing, and injuring cattle. This self-binder forms and compresses the bundle, passes the cord around it, ties a secure knot, cuts it off, and drops the bundle behind on the ground. The cost of the cord is about the same as that of wire.

The Walter A. Wood Company manufacture a pair of shears, by which, at a single stroke, the wire is cut, held fast and jerked from the bundle, before passing into the thresher.

Making, Gathering and Storing Hay.

Hay Tedders are valuable in large meadows with heavy crops, drying the hay more rapidly, and often effecting a large saving by eluding storms. The first effective one used in this country was Bullard's, represented in vol. VI, page 286 of Rural Affairs. It is manufactured by Belcher & Taylor, Chicopee Falls, Mass.

Collins' tedder is similar in construction, and is sold by Everett & Small of Boston, at $65.

Hay Rakes.—The earliest made hay-rake drawn by a horse, was the single solid rake, about 12 feet long, with the draught ropes attached to short teeth at each end, and held by the driver with a pair of handles near the middle. The driver lifted it to discharge the hay at each windrow, the horse stopping each time. The revolving hay-rake, made of wood, was an improvement, requiring no stopping, and on account of its greater cheapness than the steel-tooth rakes, is still used in some places.

The steel-tooth rakes are however, widely adopted, and are all made on the same general principle, the teeth having a large curve backwards to hold the accumulating hay, the rake running between two light wheels, and the driver occupying a seat above. The various manufacturers differ in the devices by which the teeth are raised at each windrow for dropping the hay, and all those made in this country are alike important labor-savers. Some of more complex construction, with higher prices, operate with more ease to the driver than others of simpler form and of cheaper construction.

The average price is about $30. Among the many manufacturers are the following: B. C. Taylor, Dayton, Ohio, who makes ten thousand annually; the Buffalo Agricultural Works; the Ithaca Agricultural Works; Williams Brothers of Ithaca, N. Y.; the Wheeler & Melick Company, Albany, N. Y.; J. H. Thomas & Sons, Springfield, O.; J. W. Stoddard & Co. (the Wisner rake), Dayton, Ohio; Lane, Field & Co., Millbrook, N. Y.; Remington Agricultural Works, Ilion, N. Y.; Wilson & Halsey, Ithaca, N. Y.; Belcher & Taylor, Chicopee Falls, Mass.

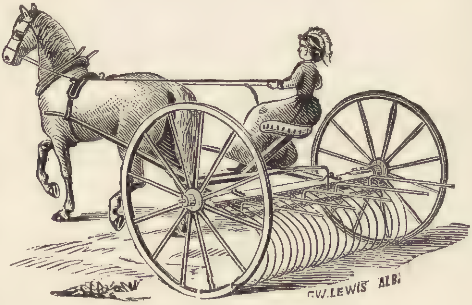

Fig. 97.—*Steel Tooth Hay-Rake.*

Furst & Bradley of Chicago, manufacture a spring-tooth hay-rake, the dumping of which is accomplished by friction bands around the cast hub of each wheel. The friction is applied equally to both wheels, with no side-draught.

FOUST'S HAY-LOADER.—This is attached to the rear of a hay-wagon,


Fig. 98.—*Foust's Hay-Loader.*

(fig. 98,) is drawn by the same team that draws the load, and saves the labor of pitching by hand. The wagon is driven astride the windrow, and the motion of the wheels of the loader carries the hay upward and drops it on the load, where one man is required to place it in position. With a

boy to drive, two men on the wagon have loaded a ton in five minutes. If the hay is heavy, it may be used without previous raking. It pitches barley and unbound grain rapidly. It is attached to and removed from the wagon in a few seconds.

This machine requires smooth meadows for its successful operation, and proves valuable on large farms; and in connection with the hay-tedder and the horse-fork and horizontal carrier, enables the farmer to secure large quantities rapidly, and to avoid the loss by storms. The weight of this machine is 500 pounds; the cost, $75. It is manufactured by Stratton & Cullum, Meadville, Pa.

Hay Carriers.—Horse-forks are connected with a contrivance so that the load of hay which they carry up by the draught of the horse, as soon as it reaches the required height, begins to run horizontally by the continued traction of the horse, and the hay is dropped at any desired spot on the mow. This horizontal motion is obtained by a wheel or pulley running on a track under the rafters of the barn, made of an iron rod about five-eighths of an inch in diameter, properly supported. It not only proves a great saver of labor, but admits of wider bays. With this contrivance a man on the load of hay, with a boy to drive the horse, may unload a ton of hay in five minutes. The carrier may be used outside the barn if desired.

Among the few manufacturers of efficient hay elevators and carriers which are now sold, are the following: Clark & Scott, Bridgewater, N. Y.; E. V. R. Gardner & Co., Johnson's, Orange Co., N. Y.; U. S. Wind Engine Company, Batavia, Ill.; and G. B. Weeks, Syracuse, N. Y.

Hay Presses.—P. K. Dederick & Co. of Albany, N. Y., have been long and extensively engaged in the manufacture of hay presses, and have reached a high degree of perfection in their machines. They have besides an extensive manufactory of farm engines, hoisting machines, dumping carts and horse-powers. They occupy four large brick buildings and several smaller ones, and their works may be seen from the N. Y. Central cars, in the valley below, just before running into Albany from the west.

Their perpetual horizontal press, driven by horse or steam power, operates continuously, and forms successive bales as fast as the hay is thrown in. One man is required to pitch in the hay, and another to bind and store the bales; and when the press is run rapidly, a boy in addition is required to assist with the bales. Important facilities have been afforded farmers who market hay, by this rapid mode of reducing it into a shape to be easily handled and cheaply conveyed to market. It gives economy in room, neatness and cleanliness, and is safer against fire.

With the perpetual press, the bales may be made of any desired length or size, but the owners find that a moderate sized bale, weighing about 100 pounds, is the most convenient to handle, as it may be carried, or thrown up, in storing. They remark that "such bales may be sold at grocery stores, like bread or tea, and a customer may take a bale or two

along in his buggy if desired." The bales being in folded sections, a single section may be taken out and fed at a time, and experience has proved that horses will pull the hay from the bales no faster than it is consumed, and loose portions are not trodden under foot.

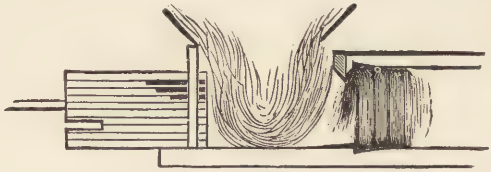

Fig. 99.

With the small bales, fifteen tons of hay may be stored in a grain car. The most rapid working machines give from twelve to twenty strokes of the traverser per minute.

The accompanying figures show the process of baling. Fig. 99 shows

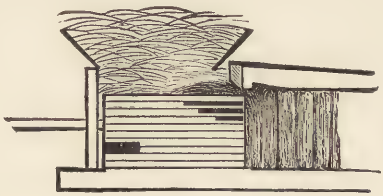

Fig. 100.

Fig. 101.

the traverser drawn back, and a mass of hay thrust into the space for pressure. In fig. 100 the hay is pressed by the traverser into the narrow space, forming the sections of the bale. Fig. 101 shows the form of one of these sections. In fig. 100 the hopper is seen filled with hay for the next section. The bales are secured by stout

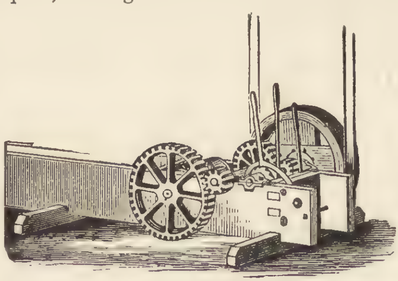

Fig. 102.

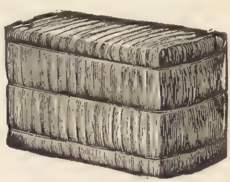

Fig. 103.

steel wires made for the purpose. Fig. 102 represents the gearing by which the powerful pressure is secured. Fig. 103 shows one of the perpetual bales, with the sections of which it is composed.

These presses are sold at prices varying from $300 to $500 each. They may be used for pressing hay, straw, cotton, moss, wool or rags.

Threshers and Separators.

Among the earliest to introduce the large machines which contain as a whole the thresher, cleaner and straw carrier, was H. A. Pitts, and his extensive works for their manufacture are still in operation in Buffalo, N. Y., with many modern improvements. More recently there are a large number engaged in making similar machines, with various modifications, but all possessing peculiar advantages, and all performing good work.

The threshers now made in this country employ two modes for separating the straw from the grain. The endless aprons were adopted many years ago by the Pitts Brothers, and have since been extensively used by other manufacturers. Important improvements have been made in the endless aprons, and when the machines are not threshing too rapidly, they answer an excellent purpose and make clean work. Another form, known as the "Vibrator," (fig. 104,) is manufactured by Nichols, Shepard & Co. of Battle Creek, Michigan, which appears to be a perfect cleaner, and a rapid thresher. Fig. 105 represents the shaker, with its series of fingers, the motion of which tosses up the straw and shakes out the grain, which falls to the screen below (fig. 106) through the slat work. These fingers do not revolve, but merely rise and fall. Their motion sends the straw onward.

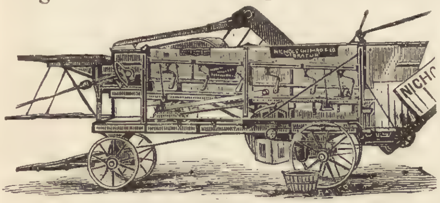

Fig. 104.—*Nichols & Shepard's Vibrator.*

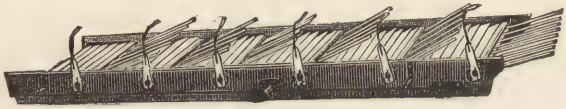

Fig. 105.—*Upper Shaker.*

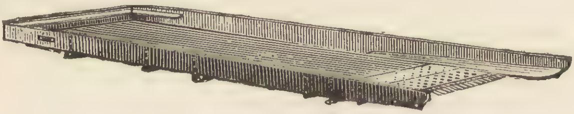

Fig. 106.—*Lower Shaker, or Conveyor.*

The concaves of the threshing machine are in three parts, two containing rows of teeth, and the third blank. These are movable, and may

be placed in different positions. When the blank is placed in *front* (as shown in the cut, (fig. 107,) the machine draws or takes grain faster; when placed between the two with teeth, it favors clean threshing; but if at the rear, clogging is prevented when the straw is wet or in bad condition.

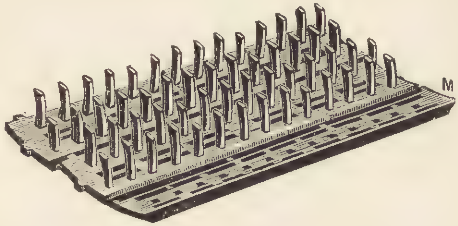

Fig. 107.—*Concaves of Threshing Machine.*

Other forms of the vibrator, effecting a similar end, have been invented, among which are those of Westinghouse & Co. of Schenectady, N. Y., and the Wheeler & Melick Company of Albany, N. Y.

B. Gill & Son of Trenton, N. J., manufacture a thresher and cleaner which, in addition to its separation of grain and straw, is supplied with a *duster*, which carries the dust from the front of the machine, away from the feeder, and out with the straw. They also manufacture a rye thresher, which removes the grain and sends the straw over a carrier, keeping it straight and parallel for binding in bundles. These threshers may be driven by tread or lever power, both of which are made by these manufacturers.

A. B. Farquhar of York, Pa., has an extensive manufactory of threshing machines, horse-powers and farm engines, employing over 200 men. The thresher and separator combines strength and simplicity; the vibrating carrier is composed of ribbed sheet-iron, with projections and open spaces, and agitators shaking the grain from the straw. A measuring hopper shows the quantity of grain.

The horse-powers made by Mr. Farquhar are of three kinds—tread, lever and steam. The steam engines are made with both vertical and horizontal boilers.

A strong coil-spring (fig. 108) is used on the geared threshers, for equalizing the irregular power of horses, or the irregular feeding of the machine, making both more uniform, and lessening the fatigue of the animals and the danger of breakage.

Fig. 108.—*Coil Spring.*

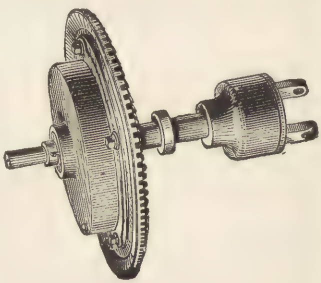

Fig. 109.—*Gearing containing Coil Spring.*

The manufactory of G. Westinghouse & Co. of Schenectady, N. Y., is one of the oldest in the country, and has long been distinguished for the excellence of its tread-powers, as well as its threshing machines. It employs from seventy to eighty men. This firm has increased its manufacture of lever-powers, which are noted for their efficiency and neatness of construction. Their thresher and separator stands among the best made in the country; and a contrivance is attached by which it is altered to a clover huller. The vibrating rods, which toss and shake the straw for separating it from the grain, act with efficiency in cleaning it in a thorough manner. The accompanying cut (fig. 110) shows the external appearance of this machine.

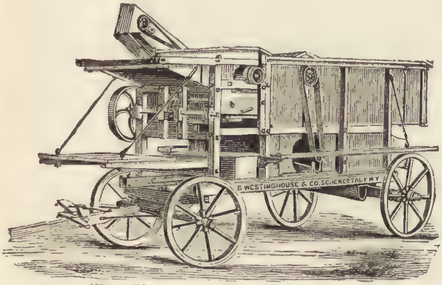

Fig. 110.—*Westinghouse's Thresher & Cleaner.*

The "Fearless Railway" tread-powers, threshers and cleaners made by Minard Harder, Cobleskill, N. Y., have been long known as among the best in the United States.

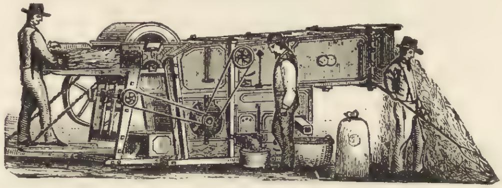

Fig. 111.—*Harder's Fearless Thresher and Cleaner.*

Russell & Co. of Massillon, Ohio, have very extensive works for the manufacture of threshing machines, which possess some important improvements for efficient work.

The Pitts Agricultural Works, Buffalo, N. Y., successors of James Braley, Braley & Pitts, and of John A. Pitts originally, manufacture extensively the Pitts grain threshers and cleaners, and lever horse-powers. These machines have long had a high reputation, and their introduction has led to a general use of the valuable labor-savers now so commonly employed.

An extensive manufactory of excellent horse-powers and threshers is carried on by A. W. Gray & Sons, at Middletown Springs, Vermont. The business was commenced in 1840, in a small way, by A. W. Gray, but after gradual increase he took his two sons into the business, and in

1875 they assumed entire control. It has increased rapidly of late years, and 1,200 tread-power machines are made annually, and 400 com-

Fig. 112.—*Gray & Sons' Three-horse Tread Power.*

plete sets of threshers and separators. The annexed cut, (fig. 112,) representing their three-horse tread-power, exhibits its appearance when in operation.

The Silver & Deming Company of Salem, Ohio, make endless chain horse-powers, having steel track-rods and wrought-iron track links. These are supplied with governors for regulating motion, and to control speed even if the belt should break or slip off. Connected with this, they manufacture an efficient threshing machine, and a separator with a succession of beaters, which raise and shake the straw at the same time that they carry it forward.

The Wheeler & Melick Company of Albany, N. Y., have for many years manufactured efficient railway or tread horse-powers, for one, two and three horses. Their combined thresher and cleaner is furnished with a vibrator for separating the straw and grain, consisting of a series of forks, which toss up the straw and carry it forward, and effect a complete separation

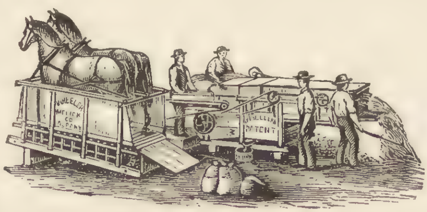

Fig. 113.—*Wheeler & Melick Thresher and Cleaner.*

Their prices, which are about the same as those of other manufacturers, are the following:

One-horse Tread-power, with all appliances,	$140
Two-horse do. do.	170
Three-horse do. do.	215
Thresher and Cleaner additional, smaller size,	220
Thresher and Cleaner do. largest size,	260

They make a threshing machine for rye, which carries the straw through unbroken, for binding in bundles. The unthreshed straw is fed sidewise to a long cylinder, and passes between two corrugated surfaces, which remove all the grain, and the straw is deposited even and parallel, from an endless apron. It will thresh 2,500 to 4,500 sheaves in a day. The price is $150.

The threshing and separating machine of C. Aultman & Co., Canton, Ohio, possesses, as they inform us, the following valuable qualities: 1. There is no friction on the beater-shaft, the belts pulling in opposite directions. 2. It threshes wheat, rye, oats, barley and buckwheat without changing the riddles. 3. It has steel spikes. 4. It has double fan-boards to centre the blast on the riddles.

The following are the prices of some of their machines: Threshers and carriers, $250 to $350; stackers, $55; lever-powers, $155 to $235; monitor steam engines, six to sixteen horse-power, $800 to $1,400; mowers, $85 to $95; mower and dropper, $145; Buckeye harvester, $180.

J. O. Spencer of Union Springs, N. Y., makes an excellent threshing machine and separator, known as the McFarland. It has threshed 650 bushels of wheat in less than six hours, with steam power.

The Stevens thresher and separator, made by A. W. Stevens & Co. of Auburn, N. Y., has a reputation of doing efficient work.

M. Williams & Co. of St. Johnsville, N. Y., manufacture a railway horse-power, and a thresher and cleaner which has received high commendation, and they state that with it eleven hundred bushels of oats have been threshed and cleaned in a day.

Among other manufacturers of good grain threshers and separators are E. M. Birdsall & Co., Penn Yan, N. Y.; Joseph Hall Works, Rochester, N. Y., and C. Aultman & Co., Canton, Ohio.

Tread and other Powers.

Tread-powers possess an important advantage for the moderate farmer. He may do his threshing at any time in winter, without securing the large force of laborers required to man a large machine; and he may employ his horse-power for the various other purposes of grinding, cutting straw or stalks, sawing wood, &c. With lever-powers from six to ten horses may be employed at a time, and more rapid work performed. Of late years, portable farm steam engines have come rapidly into use, and they will perform more work than can be accomplished with horses on a lever-power, and they may be run without cessation from morning till night, no

seasons of resting being required, as with horses. They possess another important advantage, in leaving the horses of the farm at liberty to draw the unthreshed grain to the thresher, or to convey the straw and grain away after the operation.

SMALL TREAD-POWERS.—The Wheeler & Melick Company manufacture what is termed a "pony power," or a tread-power which may be worked by a yearling calf, or a pony weighing 400 or 500 pounds. It is intended for churning in large dairies, pumping water, &c. Its price is $50. Their "dog-power" has been extensively used for churning in small dairies. A sheep of large breed is much better than a dog for working this power, as the work is less irksome to the sheep, it is easier to keep, and is always at hand in its yard or pasture. The price of this tread-power varies from $15 to $25.

HUSKING AND SHELLING CORN.

CORN SHELLERS.—For shelling large quantities of corn on large farms or in warehouses, the Adams self-feeding machines made by the Sandwich Manufacturing Company of Sandwich, DeKalb Co., Ill., have proved durable and efficient. They may be run with several horses, or with steam power, and the three different sizes will shell and clean from 600 to 3,000 bushels per day. A smaller machine, called the Farmer's sheller, is run with one or two horses, shelling 300 or more bushels per day. These shellers operate as "pickers" or spring shellers, and take the corn from the cob whether dry or soft, leaving the cob unbroken and entire. The Farmers' shellers cost from $50 to $75; the larger ones from $130 to $540. These sums do not include the driving powers.

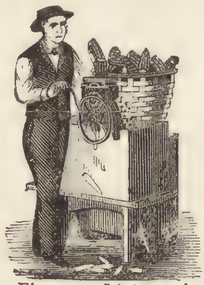

Fig. 114.—*Livingston's Corn Sheller.*

SMALL CORN SHELLERS.—Livingston & Co. of Pittsburgh, Penn., manufacture a small and efficient sheller, (fig. 114,) well adapted to farms of moderate size. It is attached to any large box or plank on edge, and will shell from five to eight bushels in an hour. It adapts itself to large and small ears. The price is $5; a smaller one at $2.50 is used for shelling seed corn, grain for poultry, &c.

CORN HUSKERS.—Philip's corn husker, manufactured by C. H. Malleson of Hudson, N. Y., strips the husks from the ears on a bed of rollers, which revolve in contact, the ears having been snapped off a moment previously by the machine in running the stalks between rollers.

Jones' corn husker, made by J. Van Zandt, Schenectady, N. Y., is similar in its general principle to the preceding, with some variation in its details of construction. Like the Philip husker, the ears are broken from the stalks by passing between rollers; and the husks are stripped off by

a series of rapidly revolving rollers in contact. A part of the rollers in the Jones husker are longitudinally corrugated; in the Philip machine they have teeth and holes. These machines will husk corn green or dry, taking it from the stalks as they are thrown upon the platform, passing the stalks out at one side, the ears at the other, while the husks are deposited beneath. They are driven by two horses, and will husk from forty to fifty bushels per hour. The cost of each is $125. The only drawback in their use appears to be their leaving the stalks in irregular heaps, instead of parallel for binding; at the same time they are crushed, improved and softened for the cattle.

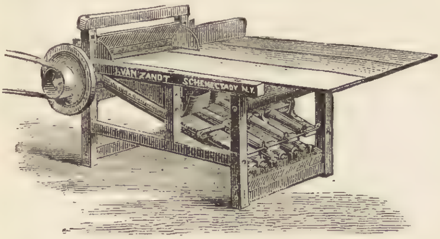

Fig. 115.—*Jones Corn Husker.*

CLOVER HULLERS.

Many years ago, J. C. Birdsell, a large farmer of Monroe County, N. Y., who was much interested in the growth of the clover crop, made many and long continued experiments, and produced a machine of which over 5000 have since been sold. This invention has contributed largely to increase the growth of this enriching crop. The machines, as now made, thresh, separate and clean the clover seed at one operation, and as their price is about $400, it is common for purchasers to traverse neighborhoods with one machine, and do the work for many farmers at moderate rates. The average of one machine is about 600 bushels for a season.

The Wheeler & Melick Company of Albany, N. Y., make a cheaper clover huller and cleaner, somewhat resembling their grain thresher, but with a hopper for feeding placed over the cylinder. The cleaned seed is discharged into a large drawer beneath. It may be run with a two-horse tread power, or a larger sweep power. It will clean from ten to twenty bushels of seed in a day, and its cost is $125. A smaller machine, for one-horse power, will clean from five to

Fig. 116.—*Wheeler & Melick Clover Huller.*

fifteen bushels of clover seed in a day, and is sold for $50. This does not winnow the chaff from the seed, which is effected separately by the use of a fanning-mill. It is specially adapted to moderate farms, which are not accessible to the larger machines.

An excellent clover-seed machine known as the "Victor," is made by the Agricultural Implement Company at Hagerstown, Maryland, and has proved itself a rapid and perfect huller. It has been found capable of threshing and cleaning from thirty to fifty bushels of seed in a day. Its cost is about $400. It is sold by H. B. White, South Barre, Orleans Co., N. Y.

Grain Cleaners.

The best fanning-mills must not only winnow out all the chaff, but remove every foul seed which may have found its way among the grain. Cockle and chess must be all taken from winter wheat, oats from spring wheat and from barley, and most important of all, grass seed must be thoroughly cleaned—clover separated from timothy, sorrel or plantain seed; and timothy from other small seeds. The best separators now accomplish all these purposes by means of sieves of various sizes and forms of meshes, and by the aid of wind currents.

Denison, Fredericks & Co. of Syracuse, N. Y., manufacture an excellent grain cleaner, known as Osborne's patent. It separates oats, cockle, wild buckwheat and other seeds from spring wheat; rye and chess from winter wheat; oats from barley; and mustard and other seeds of weeds from flaxseed. It separates and cleans from clover and from grass seed the various small seeds which become mixed with them. It owes its efficiency to the size and form of the meshes in the sieves, to the direction of the wind current from the fan, but more particularly to the jar or vibration produced in the sieves by a special contrivance for this purpose.

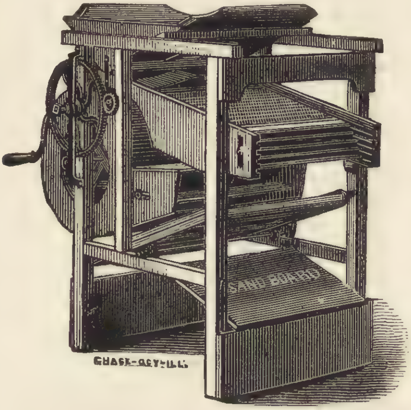

Fig. 117.—*Osborne's Grain Cleaner.*

Belcher & Taylor, Chicopee Falls, Mass., make an excellent fanning-mill and grain separator.

A separator which performs excellent work, made by J. J. Brander of Barrington, Yates Co., N. Y., is shown in the accompanying cut (fig. 118.)

It separates, oats, chess, cockle and grass seed from wheat, clover from timothy, sorrel, plantain seed and timothy from red-top, each at a single operation. It is furnished with a bagger, (seen at the rear of the machine in fig. 118,) carrying the cleaned seed to the bag suspended from it. The price of the separator alone is $30; the bagger $10; additional for warehouse work, $60 and $75.

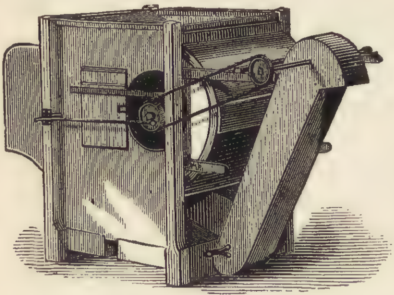

Fig. 118.—*Bradner's Separator.*

A. W. Gray & Sons, Middletown Springs, Vt., make, in connection with their horse-power and thresher, a separator, by which the cleaning process is thoroughly completed. This cleaner may be readily detached and used as a hand fanning-mill.

Feed Cutters.

Belcher & Taylor of Chicopee Falls, Mass., have made over 40,000 of their "self-sharpening feed-cutter," which appears to be an efficient machine. The knives are so accurately adjusted that every one is required to be tested by passing a single strip of thin paper through it, and if the paper is cut in the same manner as with sharp scissors, it is ready for sale. The knives play past each other like shears. The prices range from $10 upwards, varying with size. The largest size is used for large stables, and for paper mills; the balance-wheel weighs 100 pounds, and with steam or water power it will cut two tons an hour; the cost of the machine is about $75. The intermediate machines, costing from $30 to $40, run with horse-power, cut a ton an hour.

Among other feed cutters, the same firm manufactures the "junior cutter," with capped knives. If required, it will cut straw for bedding, from two to six inches long, making manure short without rotting. Another excellent machine made by them is known as the "Lion cutter," which cuts all lengths from a third of an inch to two inches, the change for which can be made in the machine in less than a minute. The feed roller is so constructed that crooked and tangled feed is presented straight to the knives. The relative position of the stationary knife to the revolving knives gives an easy and efficient shearing cut. The prices of these cutters are $18 and upwards.

There are many other manufacturers of feed cutters. Efficient machines are made by Silver & Deming of Salem, Ohio, and are run by horse or steam power. An arrangement in them is a safety fly-wheel, which continues to revolve if any obstruction stops the knives.

A hand machine called the "pony cutter," is one of the best of its kind. The cutters, run by horse or steam power, make about four hundred revolutions per minute. They have four knives, and cut all desired lengths. The prices vary from $32 to $97; the hand cutters from $20 to $27.

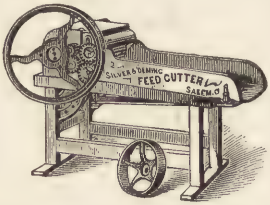

Fig. 119.—*Silver & Deming Feed Cutter.*

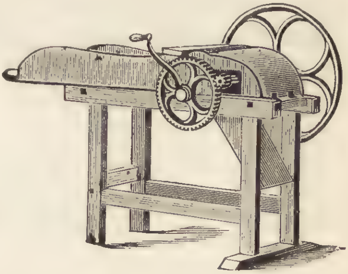

Fig. 120.—*Wheeler & Melick Feed Cutter.*

Fig. 120 represents a cutter made by the Wheeler & Melick Company of Albany, N. Y., and called the "National cutter." These cutters are strong, durable and efficient. They are of six sizes, the smaller for hand, and the larger for steam power, varying from $18 to $50 in price.

Feed Mills.

An efficient mill for grinding corn, corn and cob, oats and barley, is made by Thomas Roberts of Springfield, Ohio, (fig. 121.) It is made wholly of iron and steel. It sharpens itself by reversing the motion. It may be run with a four-horse or eight-horse power, and will grind from ten to twenty bushels of feed in an hour. It is said to answer well for grinding bones. A boy large enough to shovel in grain may attend it. It will grind from 6,000 to 10,000 bushels before the plates are worn out, when they are replaced at a small expense. The prices of this mill vary from $75 to $135,

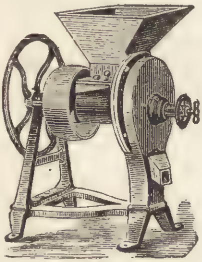

Fig. 121.—*Roberts & Bro. Feed Mill.*

Wm. L. Boyer & Bro. of Germantown, Penn., manufacture a farm grist mill, which has been in use twenty years, the grinding edges made of cast-steel, and the edges kept sharp by contact. A bolting attachment is added, for preparing family flour. The prices vary from $50 to $80. The mill may be driven by horse-power varying from one to four horses, or by steam, and will grind from eight to twelve bushels per hour.

J. A. Field & Son, 922 North Second Street, St. Louis, manufacture an efficient farm grinder, known as the "Big Giant corn mill," made of cast-iron, with chilled iron grinders, which are replaced with new ones when worn, at a cost of from $3 to $8, according to size. They inform

us that one mill with steam power has ground 6,000 bushels, and still the grinders are not worn out. The mill is actually improved by wearing, by means of a special arrangement, the wear being taken up by a set of screws. It grinds corn in the cob and husk, or corn and cob alone, or small grain, the mill being varied by turning a nut. No separate horse-power is required, the animals being attached directly to the lever. The price is $25 and upward.

BUHR STONE MILL.—The Straub Mill Co., Cincinnati, Ohio, manufacture very extensively portable mills for wheat flouring, and for corn meal. of which they inform us they have sold 7,000 during the past thirty-four years. The under stone is the running stone, which admits grain with a very small eye, and any desired speed may be given to this stone for rapid grinding, Choking is prevented, and if the mill happens to be empty, no harm is done, as the stones do not press together. The speed may vary from 100 to 600 revolutions in a minute. For horse-power, a fair average for fine flour is 2½ bushels per hour for every horse. Good threshing powers may be used to drive them. For such powers, 18 and 22-inch mills are used.

STEAM POWER ON FARMS.

The past few years have been conspicuously marked by the great increase in the use of steam power on farms, and numerous manufactories of farm engines have sprung up throughout the country. Their superiority to horse-power for many purposes is becoming well understood. Steam is cheaper and more steady and uniform in operation, and is applied with great advantage to stationary work at such times in the year as team work is crowded. The introduction of steam engines has been much facilitated by their cheaper and simpler form, and the greater ease in their management.

The smaller and low priced engines, of two or three horse power, may be employed for cutting or grinding feed, pumping water, sawing wood, driving small threshers, and churning in large dairies. The larger ones are extensively employed for large threshing machines for itinerant work, or for extensive farms.

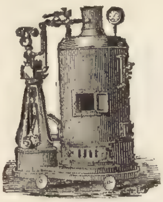
Fig. 122.—*Payne Farm Engine.*

MANUFACTURERS OF ENGINES.—B. W. Payne & Sons, Corning, N. Y., manufacture a neat and efficient vertical engine for doing farm work (fig. 122,) the smallest size being 2-horse power and sold for $125. This size consumes less than a bushel of coal in a day. From the sectional construction of the boiler, the makers insist that there can be no danger from explosion. The firm employs sixty workmen, and nearly all their manufactures are engines.

Wood, Taber & Morse, Eaton, Madison Co., N. Y., are widely known for the excellence of their farm engines, which have been largely introduced and successfully used.

James Leffel & Co. of Springfield, Ohio, make the celebrated Bookwalter engine, (fig. 123,) which is an upright tubular, made with a view to economy in fuel and safety in operation; the boiler is durable and free from leakage. Every boiler is tested by hydraulic pressure to over twice its working pressure, and steamed up and run before leaving the works. The 3-horse power boiler is sold for $165, and the engine for $75; 6½-horse power at $225 for the boiler, and $115 for engine.

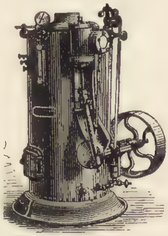

Fig. 123.—*Bookwalter Engine.*

Among the manufacturers of good farm engines, are: J. O. Spencer, Union Springs, N. Y.; C. Aultman & Co., Canton, Ohio; B. W. Payne & Sons, Corning, N. Y.; Oneida Steam Engine Co., Oneida, N. Y.; Frick & Co., Waynesboro, Penn.; Fishkill Landing Machine Company, Fishkill-on-the-Hudson, N. Y.; Watertown Steam Engine Company, Watertown, N. Y.; P. K. Dederick & Co., Albany, N. Y.; James Leffel & Co., Springfield, Ohio; Russell & Co., Massillon, Ohio; G. Westinghouse & Co., Schenectady, N. Y.; Porter Manufacturing Company, Syracuse, N. Y.; Mansfield Machine Works, Mansfield, Ohio; E. M. Birdsall & Co., Penn Yan, N. Y.; the Wheeler & Melick Company, Albany, N. Y; Wood, Taber & Morse, Eaton, N. Y.; A. B. Farquhar, York, Penn.; Whitman & Burrell, Little Falls, N. Y,; Skinner & Wood, Erie, Penn.; Blymyer & Co., Cincinnati, Ohio; F. & A. B. Landis, Lancaster, Penn.; and Williams Brothers, Ithaca, N. Y.

Wind Power.

The wind which sweeps overhead in every part of the country, possesses in the aggregate an immense amount of power, a force equal to many thousand horses being exerted everywhere without being brought into practical use. Wind power has some special advantages. Water power exists in certain localities only; wind blows over the whole face of the earth. Wind may be employed in places where other kinds of power are not to be had, and more especially on broad level plains. In the Western States it has proved of great value. Its only drawback is the extreme irregularity of its currents. Hence the ingenuity of inventors in providing means to meet this difficulty by self-regulating contrivances.

Windmills have been known for many centuries, but their simple and rude construction has required constant care in regulating to perform their required work, or prevent disasters from storms. Small windmills with fixed sails, if not more than four feet in diameter, and strongly made, may be used for pumping water on farms, without any self-regulating contrivance. If much larger, they should be supplied with a self-governor, and a simple arrangement to make them so, is to counterpoise by a weight the force employed to bring the sails against the wind. When the wind is moderate, the weight bears down and forces the windmill into a posi-

tion to receive its full force; when it becomes more violent, the weight is lifted by it, and the windmill swings around with its edge against the wind, and its motion is thus lessened, or entirely arrested. Of this construction is the Eclipse windmill. In a third class, of which the Halladay mill is a prominent representative, the circle of fans remains facing the wind at all times, but their degree of angle to the wind is regulated by centrifugal force, and the greater the velocity of wind, the more nearly the fans are turned edgewise to the current.

The most useful wind is one that moves at the rate of about fifteen miles per hour, and at any velocity between eight and twenty miles it does good work.

MAKERS OF WINDMILLS.—Mast, Foos & Co., Springfield, Ohio, manufacture the "Iron Turbine Wind Engine," the wheel and vanes of which are made of sheet-iron, secured and braced with bar iron, and so strongly put together that the manufacturers warrant it to withstand the force of any wind that will leave the neighboring buildings standing. It has what is termed a "solid wheel." Although wholly of iron, it is no heavier than windmills made of wood. It is, of course, self-regulating, turning edgewise to hard gales. It is made from 8 to 14 feet in diameter, at prices ranging from $85 to $225 respectively.

E. Stover & Brother, Freeport, Ill., make another solid-wheel wind engine, operating as a self-regulator in a simllar manner, with details of construction to give it efficiency.

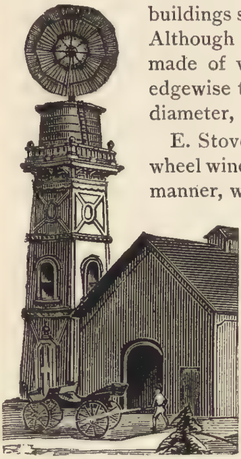

Fig. 124.—*Eclipse Windmill.*

The Eclipse Windmill Company of Beloit, Wisconsin, manufacture extensively, with an experience of twelve years, their solid-wheel windmill, (fig. 124,) which is regulated by turning the whole wheel edgewise to the wind in strong gales. It is substantially made of malleable and wrought iron. There are several sizes, from 8 to 45 feet in diameter; the latter size, with wind 15 miles an hour, possesses a force of about 25 horsepower. They will moreover build mills, at the owner's risk, up to 40 horsepower. All parts of each size are made perfect duplicates of all the others, allowing any part to be readily replaced. The company makes over 100 of these mills each month, and they are not only used in this country, but are exported to nearly all the countries of Europe, and to several in Asia and South America.

This company claims the following advantages for their solid wheels for windmills over sectional wheels: "The fans being rigid and fixed, do not tilt or move in any way; while the sectional wheels have numerous joints and pivots, which are continually wearing loose. The solid

wheel may be constructed of heavier and stronger material, and all the wind surface is utilized, and lighter winds employed."

This windmill has not only been largely employed for pumping water into the tanks of the many railroads which use it, but it may be employed to advantage for all the purposes of steam, horse or water-power on farms, in grinding feed, pumping water, cutting straw, sawing, and other work.

Halladay's windmill has been in use more than twenty years, and during this time important improvements have been made in its construction. It is one of the most steady running self-regulating windmills that have been made, admitting of a diameter of 60 feet, which, with a wind of 15 miles an hour, has 40-horse power. Of this size it is well adapted to grist-mills, and in localities of steady and uniform currents has proved a much cheaper power than steam engines. It has likewise been used in pumping water into large frost-proof tanks for the use of locomotives on railways; and in the absence of running streams may be employed for supplying water for towns and villages, for daily use and protection against fires. The United States Wind Engine Company of Batavia, Illinois, who manufacture these windmills, with pumps and tanks to accompany them, inform us that they make from 1,600 to 2,000 windmills annually, which at retail prices amount to half a million dollars a year, in which they employ upwards of a hundred men. Their price for the smallest size, or 8 feet in diameter, is $90; for 12 feet, $130; for 20 feet, $400; for 40 feet, $1,500; and for 60 feet, $3,500. The power varies from one-half-horse power for the smallest, to forty-horse power for the largest, with wind 15 miles an hour. The accompanying cut (fig. 125) represents a Halladay mill mounted for pumping water, with substantial tower and pump below. Or it may be placed on the top of any farm building either for pumping or for other farm work.

Fig. 125.—*Halladay's Windmill.*

The Challenge Mill Company of Batavia, Ill., construct an efficient windmill, which is made self-regulating by the combined action of centrifugal force and of the pressure of the wind. A movable weight on a regulating lever (within reach of a person on the ground) can be adjusted to hold the mill against a resistance effecting from 10 to 40 revolutions in a minute, and no increased velocity of the wind will change the speed of

the mill. When the wind increases, the sails open to the wind, and present only enough surface for the desired velocity. As the weighted lever holds the faces of the sails to the wind, any accident causing a break in connection between them at once stops the mill, bringing the edges of the sails to the wind. Hence the safety of this arrangement, even in the most violent gales. By moving the weight on the lever, any desired number of revolutions per minute are given, and this number is not changed, whether the wind blows ten or forty miles an hour.

Water Power.

Among important improvements which have been largely introduced of late years, is the turbine water wheel. The large wooden overshot wheels have to hold and carry all the water while its force is acting. Turbine wheels do not hold the water, but merely act from its pressure in the flume above. Hence a turbine wheel of quite small size, receiving all the force of a high column of water, may impart great force to machinery. Turbine wheels are horizontal, and the water acts at once on the whole circumference. Being under water, they do not freeze. They are not stopped by the back water of a flood.

The annexed cut (fig. 126) represents the turbine wheel made by the Cortland

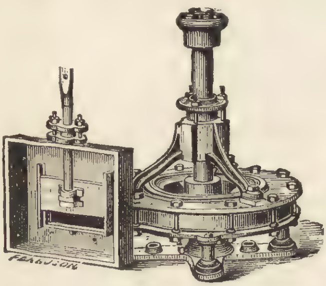

Fig. 126.—*Carley's Turbine Wheel.*

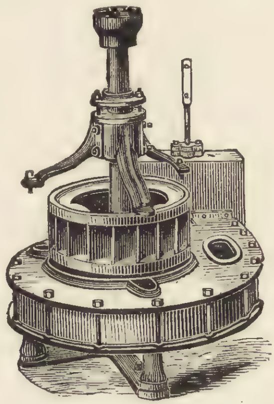

Fig. 127.—*Wheel Lifted out of Case.*

Foundry and Machine Company, Cortland, N. Y., and known as Carley's turbine. It represents the orifice through which the water is admitted to the whole circumference of the wheel. Fig. 127 shows the wheel lifted out of the case, and the form and arrangement of the buckets, which are made of steel or wrought iron, cast into the rims of the wheel, imparting to it the great strength required to sustain the heavy weight of water in the flume above.

Among the largest turbine wheels which have ever been made are those manufactured by James Leffel & Co. of Springfield, Ohio, the wheel proper being 8 feet in diameter, with a head over 10 feet. Higher heads

usually require less size of wheel. In one instance they made an exceedingly strong 9-inch wheel, for 300 feet head, and with 80-horse power.

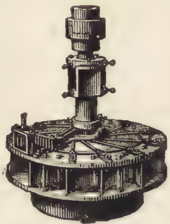

Fig. 128.—*Leffel's Turbine Wheel.*

One of the most powerful wheels which they have in operation is a 35-inch wheel, under a head of 64 feet, giving 400-horse power. It was made in the best, strongest and most substantial manner, mostly of steel and bronze, and the shaft was of solid forged steel. They have put four wheels in one mill, each 7 feet in diameter, each of which possesses, when run at full capacity, 460-horse power. We mention these instances to show the great power possessed by turbine wheels. J. Leffel & Co. are extensive manufacturers of turbine wheels of all sizes, and have now 7,000 in operation in different parts of the United States, from their establishment.

As turbine wheels do not lose more than one-seventh or one-eighth of the whole descending force of the water, the power of any stream may be determined beforehand with much accuracy. For example, a stream which falls 10 feet, and discharges 53 cubic feet per minute, has an inherent force of one-horse power. For, as a single horse power is equal to lifting 33,000 lbs. 1 ft. per minute, or 530 cubic feet of water to the same height, it will be the same as raising 53 cubic feet 10 feet high. Add one-seventh for waste, and it will give 60 cubic feet as required for active power. Larger streams, or higher fall, may be accurately computed on this basis.

Water may be thus employed occasionally for driving farm machinery, for threshing, grinding feed, shelling corn, and sawing wood. A wheel 8 inches in diameter, with 40 feet head, and a stream large enough to fill it, will have 8-horse power.

Farm Scales.

As every good farmer requires platform scales for weighing what he raises and what he sells by the load, as well as for ascertaining the increase in the growth of his animals upon the feed given them, it often becomes important for him to know where he can procure suitable scales possessing sufficient accuracy at moderate prices.

Edward F. Jones, commonly known as "Jones of Binghamton," N. Y., makes platform scales specially for farm use, and by not employing traveling agents, furnishes them directly to farmers at moderate prices. Portable machines, which will give the weight of from 400 to 2,500 pounds, are sold at $15 to $35. Wagon scales, with the freight paid, are sold for $50, and are capable of weighing five tons. To prove their excellence the manufacturer furnishes them on trial.

Osgood & Co. of Binghamton, N. Y., who have manufactured scales for forty years, furnish all the metal parts, including the cast-steel bearings,

scale beam, &c., with freight paid, for scales weighing five tons, for $25. Timbers for the wood levers are furnished by the purchaser, and may be finished and set up by a carpenter in two days. They give rubber bearings to prevent sudden jar, for $10 additional. The price is not paid until their accuracy has been tested. Illustrated directions are furnished for setting up. Or the manufacturers will set them up for $40 and $50 respectively, and warrant them equal to the best iron lever scales.

Churns.

The old simple dasher churn possesses some important advantages over the newer churns worked by rotary motion, more particularly in the completeness with which the butter is separated from the wood with which it comes in contact. The Bullard churn appears to possess all the advantages of the vertical dasher churn, with great ease in working. It consists of a box without floats or paddles; and the motion backwards and forwards is rendered easy by two balance wheels. It is thus easily kept clean. Experiments show that it secures from a given quantity of cream more butter than is obtained from most of the churns in use. It is made by Bullard & Ellsworth, Barre, Mass., and Moseley & Stoddard, Poultney, Vt. The prices are $15 and $20.

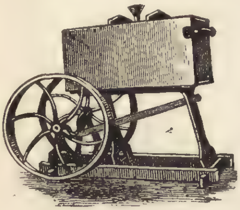

Fig. 129.—*Bullard Churn.*

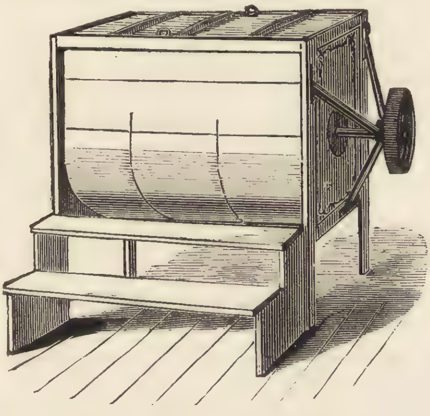

Fig. 130.—*Blanchard Factory Churn.*

The Blanchard churn (manufactured by Porter Blanchard's Sons, Concord, N. H.,) is also highly esteemed by the best dairymen for its con-

venience, efficiency and durability, combining as it does simplicity of design with excellence of materials and workmanship. Fig. 130 represents a large size, intended to be driven by power.

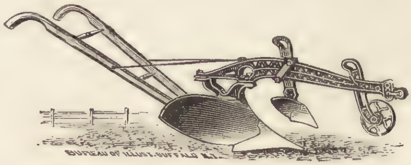

Fig. 131.—*The Wiard Chilled Cast-Iron Plow.*

THE WIARD PLOW.—The above cut (fig 131) represents the Wiard chilled cast-iron plow, with malleable beam, referred to on page 94, and not received in season for insertion in its proper place.

LOSS FOR WANT OF DRAINAGE.—J. J. W. Billingsley of Indianapolis, editor of the Drainage Journal, gives some interesting facts in the Report on Statistics for Indiana, showing the loss sustained in that State by the want of the drainage of lands now nearly useless by surplus water. The swamp lands in the northwestern and other portions of the State are estimated to be worth $14,000,000, this value being largely prospective, contingent upon possible future drainage. If drained and subducd, they would raise corn, oats, the grasses, and in a few years would become fine wheat lands. At present they yield only coarse or wild grass for summer pasturage. For successful drainage they would need a system which would embrace the whole area, and the main or open ditches would have to be provided by the State. When drained, their increased value would be $70,000,000. After being brought to a good state of cultivation, their annual products would aggregate more than $20,000,000. In addition to these, there are more than 2,000,000 acres of rich or very rich lands rendered largely unprofitable by the uncertainties of the seasons, which, if wet, render it nearly impossible to cultivate them. The drainage of these 2,000,000 acres would add at least $25,000,000 to their value. Above all these financial advantages, would be the beneficial effect on health, in the reduction of malarial diseases, including chills and fevers, neuralgia, pneumonia and diptheria. Rapid progress is making in underdraining in Indiana, vast as the work is which remains to be done. The first hand machine for making pipe-tile was brought into the State about 1850. Horse machines and steam-power mills followed. In 1860 there were 20 tile manufactories in the State, and 58 more were added between 1860 and 1870—in the next ten years 380, and at the present time there are 486, and great improvement has been made within a year or two in the machinery and in the kilns. At first the tiles were made too small; a larger size is now sought and employed, but we are not informed what these sizes are.

THE

ILLUSTRATED ANNUAL REGISTER

OF

RURAL AFFAIRS.

ORNAMENTAL FARM GROUNDS.

IN FORMER VOLUMES OF RURAL AFFAIRS we furnished our readers with a number of designs for ornamental grounds, mostly for small lots or for village residences where a limited extent of ground was to be occupied. We propose on the present occasion to give a few designs specially adapted to farm residences, and partly with a view to bring a portion of the farm itself into the design, without occupying much of the land exclusively for ornamental purposes. The reduction of such designs to practice will not only make country homes more attractive to the farmer's sons and daughters, but it will stimulate to greater neatness in the condition of the farm and in the removal of all obstructions to profitable culture, in order that something of the finished appearance of the home grounds may extend beyond their proper boundaries to the adjacent fields.

An essential requisite in securing such homes, is to give the whole farm, or at least the nearer portions, a neat appearance by removing all disfiguring or repulsive objects, giving outhouses a pleasing exterior, providing finished fences, and planting lines or belts of trees where they may act as screens against severe winds. The orchards in near proximity to the dwelling should be planted with the more symmetrical growers, as with such pears and cherries as have regular outlines of form.

It is not necessary to incur much expense in thus beautifying country homes. The farmer with small means may plant a half acre around his dwelling so as to present a small landscape appearance, and cut the grass rapidly once a week with a hand lawn-mower. He may cut a few circular flower beds in the turf, in which shape they are easily kept in order. The owner of a large farm may devote several acres to the same purpose, give his plantings a more park-like appearance, and keep the grass short by the grazing of a flock of sheep. Many would be satisfied with this arrangement, while others would wish a smaller portion of the grounds near the house shut off from these sheep with a wire fence, using the lawn-mower for it, and plant with small shrubs and flowers, as one's preferences might demand.

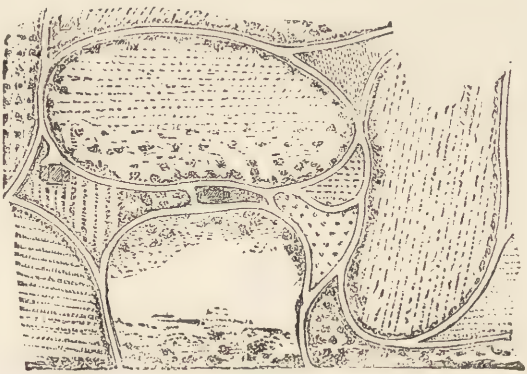

Fig. 133.—*Ornamental Farm.*

We furnish a few plans in illustration of these suggestions, in which greater or less attention is given to ornamental effect. The first, shown in fig. 133, represents an ornamental farm, the outlines of the fields laid out in curved lines and bordered with carriage drives. This farm is not occupied by the man whose chief object is to make money from his land, but by the owner who wishes to combine with a pleasant home the comforts and luxuries to be had from the soil. One-half of his farm, including the portion represented, may be laid out in this way, and the remain-

der with fields in a more regular form (as shown by fig. 134) or the whole farm may be arranged in this ornamental style. The carriage roads are not merely for ornament; they afford ready means to their owner for reaching in a wheeled vehicle any part of his farm, and they give free access to the fields for work, for drawing manure and for removing the crops.

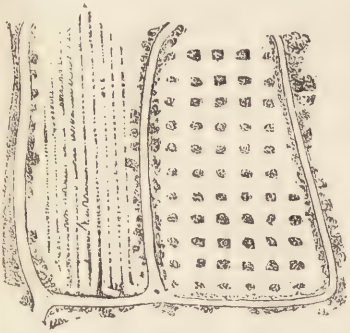

Fig. 134.

If the soil is light or gravelly, it will form the material for these roads, except the portions near the residence; if clayey, a good tile drain should extend the whole length under them, and a covering of gravel in addition may be necessary.

The fences for the boundaries of the fields may be buckthorn or other low-growing hedge, with a barbed wire stretched lengthwise through the centre. This wire will preclude the intrusion or passage through it of cattle, while the hedge itself will prevent their striking and becoming injured by rushing against the barbs. If the fields are not to be occupied as pasture, but only with meadows or cultivated crops, there will be no necessity for this barrier.

Very few owners of farms will care to adopt this mode of ornament; and it should not be chosen without ample means to keep the whole place in neat and finished condition, and the fields under high culture. The expense, however, of keeping such a place of moderate extent in good order, in connection with the cultivation of the farm, would be far less than that of maintaining a place of equal size devoted exclusively to ornamental or landscape planting. It would be well adapted to a fruit farm, and, if properly managed, a high degree of ornament, as well as of profit, might be derived from it.

Fig. 135 exhibits a finished farm laid out in straight lines and rectangles. This mode can be strictly adopted only in those regions of country which are nearly level, or which have but a moderate slope. The same general style may however be adopted among hills by varying the outlines of the fields according to the principles laid down in the plans on page 135 of the second volume of RURAL AFFAIRS. In the plan which is here presented, which is well adapted to a farm of two hundred acres or so, or to a smaller one, there are nine principal fields of about twenty acres each, beside the orchards and home grounds. Every field is reached by a road, without resorting to the common objectionable practice of passing through another field. The boundaries of the farm as well as of

its subdivisions are lined with shade or timber trees. These lines of trees, if set out alternately of trees of different ages, or at different times, may be cut for timber by taking alternately the large ones, leaving the smaller to remain. They will form screens against the severity of the winds in all places where much exposed, and prove of value in the way of shelter to the crops. Such trees should be selected as do not exhaust the soil by long extended roots. The elm, for this reason, should be rejected, and such trees as the oaks and black birch chosen.

Fig. 135.—*Regular Ornamental Farm.*

It will be seen that a few acres only are occupied by the dwelling and its ornamental surroundings, which may be planted with large shade trees, and the grass beneath them cropped short at no expense by a flock of sheep; or more elaborate grounds may be kept in order with a hand or horse lawn-mower. After such a farm is laid out and planted, it will cost no more to keep it in neat order than any other farm—unless indeed it be one where the whole aim is to make money without affording any attractions to the home where the family is to spend the whole of their days, and where not a shade tree or a flowering shrub is planted; where the public road is made into a barnyard, and the house surrounded with unadorned bleakness.

Fig. 136 represents the front portion of a farm, occupied with the dwelling, barn and surroundings. On the left of the house, and in its rear, is the kitchen garden, arranged so as to be cultivated with a horse through its entire length. Small orchards are on the right and left. In the rear of the barnyard is a calf pasture, sheltered on three sides with screens of Norway spruce, and the barnyard is partly sheltered in the same way. An evergreen

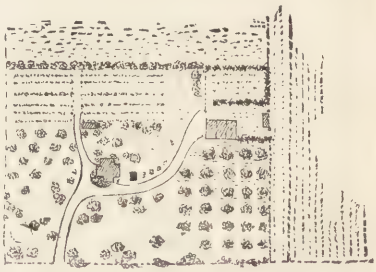

Fig. 136.—*Front Portion of Farm.*

screen, when sufficiently grown, is equal to an open shed. Such a shelter is represented on page 222 of the fifth volume of RURAL AFFAIRS, and its general appearance surrounding the barn is shown by fig. 137. The

Fig. 137.—*Screen around Barnyard.*

farm road on the right side of the plan is near the middle of the farm, and affords ready access and exit for all heavy loads to or from the farm, without cutting up the separate carriage road at the dwelling.

Fig. 138 is a plan of grounds where it is desired to give a breadth of shade, as well as exclusion near the public road, without occupying much of the farm for ornamental purposes—the dwelling being quite shut in from the public by dense plantings. The carriage entrance is at one side, and a small walk opposite gives access and exit on that side of the house.

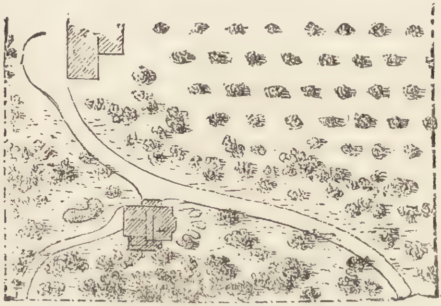

Fig. 138.—*Secluded Residence near Public Road.*

In the rear of the dwelling the planting is more symmetrical, so as to harmonize in part with the orchards farther back. These plantings may be of the more regular in outline of the small ornamental trees, and gradually pass to such fruit trees as assume a good outline and grow well in grass, as the Buffum, Boussock and Tyson pears, and the Early Richmond, Morello and Downer's Late cherries. The orchard is laid out on the hexagonal plan, which gives more variety to the outline at the same

time that straight lines may be adopted. This mode of planting is shown in detail on page 276, vol. I of RURAL AFFAIRS.

In planting the ornamental gardens of all these various designs, they may consist of beds cut in the smoothly shaven turf (the circular form being the most convenient) away from the shade of trees, where the flowers can have the full benefit of sunlight, as shown in fig. 139; or they may be

Fig. 139.—*Open Garden.*

flanked with the growth of trees and large shrubs, as shown in the vignette at the head of this article. For this shaded garden, flowering shrubs may be more largely employed than bedding plants, and such flowering plants selected as will flourish in a partial shade.

FRUIT HOUSES AND FRUIT ROOMS.

FARMERS WHO RAISE A SUPPLY OF APPLES and other fruits, usually sell at once the surplus, and keep enough for their own use in cellars. The best mode for retaining this home supply is an important question. Every family should have the benefit daily of fresh or cooked fruit from the time of early ripening in summer, till the appearance of strawberries the following season.

But a large portion is often lost through want of suitable apartments. Cellars may be too warm and damp, and decay commence soon after the fruit is stored. Impurities and foul air may impart to it a bad flavor. Even those who take the pains to make smooth and hard cement floors, which are kept scrupulously clean, lose much from a want of regulated ventilation. To prevent this loss and disappointment, and to point out an easy mode by which apples may be kept sound and fresh through winter and spring, and pears till after mid-winter, is the object of the present remarks.

Rooms for keeping fruit are constructed with two distinct objects in view—retaining it for a moderate family supply; and holding it over in large quantities for spring sales, when the low prices of autumn have passed to the high rates of approaching summer. The former are

needed for every family; the latter only for large orchardists and fruit dealers.

The family fruit-room should therefore be as cheap in construction, and as easy in management as will be admissible with success. It may occupy a portion of the cellar under the dwelling, or it may be placed beneath a barn or other outhouse. The latter would be less ready of access, while it would have some special advantages. It should be away from all bad odors, which soon ruin fruit. Owners will generally prefer the house cellar. In this case it will be absolutely necessary to secure an apartment separate from the rest of the cellar, where proper ventilation may be constantly given, and all odors excluded.

An 8-inch brick wall may form the partitions for this room. A cement floor will prevent too much dampness, and assist in securing perfect cleanliness. Both of these objects will be assisted by cementing the side walls. If the subsoil is porous gravel, the room may be dry enough, but it cannot be kept clean without the cement floor. For purposes of ventilation, windows should be inserted in at least two sides, and if opposite, it will be still better. They are to be hung on hinges and supplied with hooks, so as to be partly or wholly opened. On the approach of winter, and as soon as the room is filled with fruit, frequent attention will be necessary to keep the temperature, if possible, only a few degrees above freezing. One or two thermometers will serve as a guide. If the weather is mild, the windows may be opened for the night, and shut during the day. While the cold of winter lasts, they may be opened to such a de-

Fig. 140.—*Cross-Section of Fruit-Room, showing Shelves and Air Currents.*

gree as to maintain the low temperature mentioned. A sufficient circulation will thus be maintained in the air, which being colder from outside, will immediately fall to the floor on entering, move over the bottom, and pass out at the opposite lee side. The difference between the keeping of fruit thus managed, and such as may be carelessly placed in common cellars, will surprise those who have not seen both modes tried. The last mentioned will decay before spring, the former may be kept till summer.

Fig. 140 represents the cross-section of a fruit-room in a cellar, the

windows being opened on opposite sides, the cold air falling as it enters, and the warm air rising and passing out on the opposite side.

A more perfect fruit-room in the basement of a dwelling (fig. 141) may be made by additional security against the entrance of warm air, and by drawing in cold air during cool nights by artificial ventilation. When this is done, the low temperature is retained, should the weather become

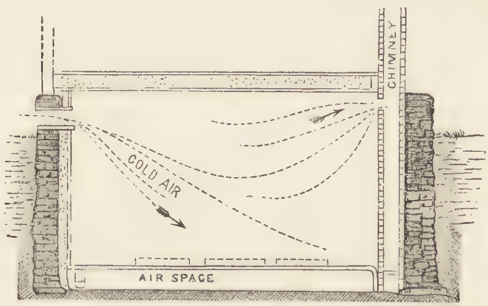

Fig. 141.—*Cross-Section of Fruit-Room, with Artificial Ventilation.*

warmer, by carefully shutting every avenue. It has an air-space beneath the floor and a space filled with sawdust above. It is well to line the walls with tarred or building paper, in which case the space need not be so thick. The windows may be double glazed, and there should be a small entry, with two doors for passing into the room. In order to draw the cold air into this room from without, it should be connected with the kitchen or other chimney, in which an upward current of air is caused by the fire. This connection may be made by means of stove-pipe or other air tube. Whenever a cold night occurs, the windows and the register in the air-pipe are thrown open; the current in the chimney withdraws the air from the fruit-room, and the cold air from without rushes in to supply its place. Early the next morning the windows and register are closed; the low temperature thus obtained will continue through the day. If the walls and ceiliug are lined and packed with saw-dust, the cold air will be retained for several days. By the use of thermometers, a uniformly low temperature may be maintained until cool nights in spring come to an end. The dotted lines at the floor below show the board registers which are opened in warm weather to admit the earth-cooled air, which is drawn up by the chimney current.

A still more perfect fruit-house is made by constructing a separate building wholly above ground; or if there is a natural drainage to the soil, it may be sunk a foot or two. The walls may be whòlly of wood, or may be constructed of brick or stone outside, and wood inside, with a space between them; or they may consist of two board partitions a foot apart. Or there may be three separate brick walls, with air-spaces

between them, the central one with brick on edge, with the necessary brick cross-ties. The house should be built high enough to allow a chamber overhead to serve as an entrance to the fruit-room below, which is reached by stairs. The advantage of this arrangement is that the warm air will not readily descend into the fruit-room, and its lower temperature will be more perfectly maintained than through a side entry. Wooden tubes for ventilation pass through the chamber above with openings which may be easily closed at the ends, for the admission of cold air. The precise temperature of the room below may be easily ascertained at any time without admitting warm air in entering it, by providing vertical rods of wood about two inches square, which slide up and down through the floor near the wall, and are secured with fastenings like those of windows. A thermometer is placed in a niche cut in the lower end of the rod, so that it is drawn up and examined by the attendant in the apartment above.

The fruit houses erected by N. and J. Cope of Ohio, for an account of which we are indebted to M. B. Bateham, are constructed on a similar principle. They are about 50 feet long by 25 feet wide, and will hold 4,000 or 5,000 bushels. The walls are made with two sills on the stone foundation, and with two rows of studding, secured from spreading by cross-ties, giving a space of 12 or 15 inches between the boards, to be filled with sawdust. Mr. Bateham thinks this space should not be less than 15 inches in order to make it perfectly frost-proof and air-tight. The ceiling over the fruit-room and beneath the upper floor is filled in with sawdust like the walls. The floor of the fruit-room has the joists run lengthwise with the building, supported by a cross-sill in the middle, and this rests on stone piers, to prevent any sagging by the weight above. Spaces between some of the joists are formed into air ducts extending from each end to the middle, and openings are left at their ends, like cellar windows for the admission of air into these ducts. Iron grating excludes rats and mice, and a shutter excludes the air. In very cold weather the spaces may be filled with straw. Spaces are cut in the floor over the ducts to allow the air from without to enter the room; these are about a foot square and five feet apart, and are covered with iron or wooden grates.

In the fruit house of N. Cope the regulation of the temperature is effected entirely by natural ventilation, the warmth in the apartment above drawing the air upward through the air tubes.

J. Cope in his patented fruit-house employs artificial heat, and effects a more rapid change of air. The air tubes are stovepipes connected with one or more small stoves in the upper apartment, which when heated produce rapid upward currents of air from the fruit room, the cold air rushing in below at the same time. The doors are only opened to receive the fruit, and are double and packed. The stairs are either outside or in a separate entry, and care is taken not to open the room either in warm

or very cold weather. A slatted floor admits the natural heat from the earth.

An excellent mode is adopted for filling these houses, by using crates holding each about a bushel and a half, which are filled in the orchard, carried in and piled regularly in the fruit-room, the fruit not being disturbed from the time it is picked in the orchard until the following spring.

The cost of these houses is moderate. They are used for keeping apples in large quantities for spring markets. The room is kept dark, except by the admission of light from a single double window, in storing the fruit.

An important improvement may be made in this fruit house by substituting Mott's or Espy's ventilator caps, or the one represented on page 154 of vol. VII of RURAL AFFAIRS, for producing air currents in place of the artificial heating by stoves. These ventilator caps, and Mott's most conspicuously, produce an upward current in the chimney to which they are attached, whenever the wind blows, even in the absence of any fire. If, therefore, they are attached to the air tubes over the building, cold air may be thrown into the fruit-room through their agency, whenever there is any external breeze. By closing the registers after this is effected the cold air is retained. It is often important to cool the fruit rapidly, when at mid-autumn it has been placed in the fruit-room. This process is readily effected in the manner described, and entirely obviates the labor of first storing the fruit in a cool outhouse in autumn, and then removing it again to its winter destination.

The Boston Journal of Chemistry gives the following description of a good fruit house:

"Ten years ago we constructed a fruit cellar under our stable, and it has proved so satisfactory that we venture to give a brief description of it. The division walls are constructed of brick, and the apartments are two in number, an outer and an inner room. The outer room is but partly underground, and is 10 by 12 feet in area, and 8 feet high. The inner room is wholly underground, and frost proof; it has four brick walls and a cemented floor. In this room the fruit is stored early in December, when the weather becomes cold. The outer room holds the fruit during the autumn months after it is gathered, and it is cool, well lighted, and dry.

"The windows are left open and a free circulation of air allowed so long as no danger from frost exists. When the fruit is taken to the inner room, the door is closed, and no light admitted. Ventilation is secured in moderate weather by opening the inner door and throwing down a window in the outer room. In this cellar we kept apples of last season's growth until the present winter in perfect condition. Some of these apples, exhibited at the autumn agricultural fairs, were pronounced as fresh as those of the past season's growth."

Modes of Storing Fruit.

For daily family use, fruit should be placed so as to be readily accessible. The most convenient arrangement consists in a succession of shelves, one above the other, in the centre of the fruit room, with a passage around them next to the walls. If about five feet wide, the centre may be easily reached from the passages. Specimens which show indications of decay are easily selected for daily use, and the hard and sound ones retained for longer keeping. These shelves may be about two feet apart, so as to afford ready access in assorting. A plan of the room is shown in the accompanying figure, (fig. 142.)

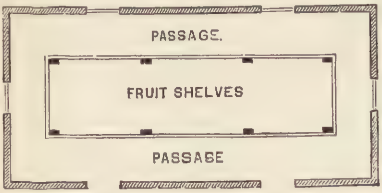

Fig. 142.

By constant and careful selection and removal of the most perishable specimens, sound fruit may be had until late in spring; when a portion of the soundest, placed in shallow boxes beneath and closely fitting under the lower shelf and on the cold floor, may be kept till mid-summer. By the adoption of this method we have a daily supply of such apples as the Baldwin till the middle of July, in a sound, crisp and juicy condition.

When secured in close barrels apples will keep longer, being protected from air currents, and from changes of temperature. The trouble is we cannot see when decay commences. None but long keepers should therefore be stored in barrels. Some experience will enable the owner to know how long the barrels may be safely left unopened. It may be well to provide shelves as well as a space for storing the barrels, according to the plan shown in fig. 148. Fruit for daily use may occupy the shelves; long keepers can be packed in barrels.

When apples are packed in boxes in the orchard, it is well to pile them up, in a sheltered place, as shown in fig. 143. This mode admits the free circulation of air, and they may be protected from the weather by a board cover. As winter approaches, they are conveyed to the cellar or fruit room without disturbing their contents. Or if they are received in a cold fruit house, the fresh fruit may be at once conveyed to it.

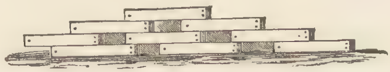

Fig. 143.—*Piling Fruit Boxes.*

When packed away for winter, the boxes may be disposed of as shown

in fig. 144, and when they are examined for the removal of decaying specimens, the boxes are taken down one at a time, and replaced in a new pile. It will obviate the necessity of disturbing or turning over the fruit for examination, if the boxes are quite shallow or only 3 or 4 inches deep, so as to contain only a single layer of specimens. They should have slatted bottoms, to admit the circulation of the cool air.

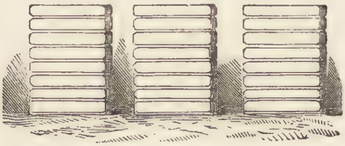

Fig. 144.—*Storing Fruit Boxes.*

If the lumber of which they are made is sawed of the right width, they are rapidly constructed by nailing together. A convenient size for the boxes is 20 by 24 inches, with slats at the bottom two inches wide and three-fourths of an inch apart. They will be cheaper for the same contents if six inches deep; but the fruit is more easily picked over when in a single layer with a depth of only three inches.

When barrels are stored in the fruit-room, it is recommended to place

Fig. 145.

Fig. 146.

them on their sides, as shown in fig. 145. It is often more convenient, however, to deposit them on end, in which case they keep nearly if not quite as well. By placing a broad board on the top of the lower tier, the next may be set upon it, as shown in fig. 146.

If barrels are wholly used, they may be deposited on their ends in the fruit-room, as represented in fig. 147; or the double tier through the middle may be changed to a single one with the barrels resting on their sides.

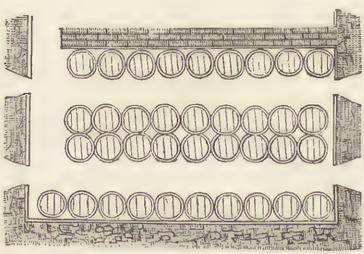

Fig. 147.—*Arrangement of Barrels.*

Fig. 149 is the plan of a fruit-room with shelves in the centre for the

more perishable sorts, with space enough for a row of barrels along each side, containing the long keepers.

It is well to estimate beforehand the required contents of a fruit-room. One arranged wholly for barrels, as in fig. 147, will hold nearly 200 bushels, if the tiers of barrels are five feet high. With shelves in centre as in fig. 149, the same room will hold about two-thirds as much, shelves requiring more than double the space occupied with barrels for the same capacity.

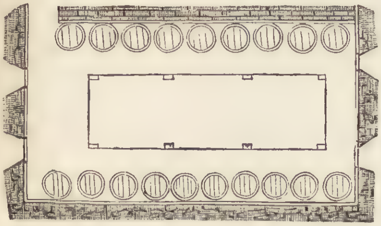

Fig. 149.—*Barrels and Shelves.*

We have found a series of drawers, represented at fig. 150, more convenient and more compact for keeping apples and pears than any other mode. The drawers are 3 inches deep and the sides measure 3 by 3½ feet. They have slatted bottoms. With a single layer each one holds about a bushel. The case of drawers is 8 feet long, 3 feet wide and 6 feet high. The pieces are all cut of the right size, the drawers made, and the rest of the work completed in the fruit-room. Nails are exclusively used for all the parts. The shelves slide on strips an inch square, which keep the shelves an inch apart for

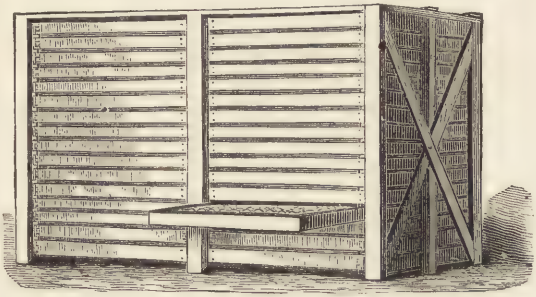

Fig. 150.—*Thirty Drawers for Apples and Pears, holding Thirty Bushels.*

the admission of air, and for grasping the sides when drawing them out. They sustain themselves firmly in their position when drawn out within 6 inches of the rear side. Board partitions at their sides keep them in their places. The thirty drawers will hold thirty bushels, which is a larger quantity than can well be packed in any other form. The upper ones are examined from a step-ladder. The whole cost, including drawers, lum-

ber, nails and work, was only $20. Any desired number of these cases may be placed in a fruit-room.

In conclusion, the following rules may be presented for strict observance in keeping fruit:

1. Let the temperature be kept as near the freezing point as practicable.

2. Keep the temperature as uniform as possible, as an occasional warm draught hastens decay.

3. Exclude air currents of any kind not required to maintain a uniform degree of cold; hence drawers or covered boxes are better than open shelves.

4. Keep all odors away from the fruit, especially such odors as come from badly kept cellars.

THE NEWER PEARS.

AMONG THE MANY HUNDREDS OF NEW PEARS which have been introduced of late years there are few which deserve special attention on account of their excellence or desirable qualities. Among the most valuable new sorts we give notices and descriptions of the following, to which others may be added in the future:

JONES' SEEDLING (fig. 151.)—Its origin was near Philadelphia. In size it is below medium, form obovate, acute at the stem, often with a slight suture from stem to crown; nearly the whole surface is covered with a thin cinnamon russet on a yellowish skin, often reddened towards the sun; stalk fleshy at base; calyx large, spreading; flesh buttery and very juicy, with a slightly acid or nearly sweet flavor; "very good." Downing gives October as its period of ripening, but the specimens we have raised are not mellow till January, and its keeping qualities are among its chief merits. Its small size will prevent its becoming popular.

Fig. 151.
Jones' Seedling.

Fig. 152.
Petite Marguerite.

PETITE MARGUERITE (fig. 152.)—This excellent little pear originated

on the grounds of Andre Leroy of Angers. The fruit is rather below medium in size, short obovate pyriform (Madeleine-shaped), surface slightly uneven; skin greenish yellow, becoming pale yellow, brown to the sun, dots numerous, greenish; stalk long, slender, set in a narrow and rather deep cavity: basin rather large, somewhat wrinkled; flesh white, buttery and melting, sweet, very good. It ripens the latter part of August; the tree is moderately vigorous and very productive.

FREDERIC CLAPP (fig. 153.)—Since the general introduction of the widely known Clapp's Favorite, produced by Frederic and Thaddeus Clapp, another variety has been brought to notice by Lemuel Clapp, brother of the two former, which promises high value. It was produced from seed of the Urbaniste, crossed by the Beurre Superfin, resembling the latter in flavor. The fruit is rather large, roundish obovate, somewhat variable in form and often irregular; the skin is bright yellow, without blush or russet, but with many minute dots; stalk an inch long, slightly sunk; calyx rather small and nearly closed, set in a shallow basin; flesh light yellow, fine grained, juicy, melting, slightly aromatic, with a high vinous flavor.

Fig. 153.—*Frederic Clapp.*

Fig. 154.—*Duhamel du Monceau.*

DUHAMEL DU MONCEAU (fig. 154.)—This fine pear was raised by Andre Leroy of Angers, France. The fruit is full medium in size, pyriform, rounded, regular; skin deep yellow, with a slight brown blush in the sun, with some patches and nettings of russet, the whole surface often a rich cinnamon russet, dots numerous; stalk medium, curved, oblique, scarcely sunk, sometimes lipped; calyx partly closed, in a very shallow, wrinkled basin: flesh a little granular, buttery and very melting; flavor not very rich, but agreeable and delicious. Specimens of this fruit received from Messrs. Ellwanger & Barry the middle of January were as melting as any pear of autumn.

Souvenir du Congres (fig. 155.)—This is a magnificent fruit in appearance when well grown, and although variable in form, size and quality, has attracted much attention from fruit growers. The tree is of vigorous, upright growth. Fruit large, sometimes quite large, long pyriform; surface more or less uneven or wavy, rich yellow, often with a red cheek; stalk curved, slightly sunk; calyx in a deep-furrowed basin; flesh buttery; quality variable, "good," sometimes "very good." Ripens early in September, and continues some weeks. More time is needed to prove the general value of this pear in different parts of the country.

Fig. 155.—*Souvenir du Congres.*

Fig. 156.—*Doctor Reeder.*

Doctor Reeder (fig. 156.)—This is a small and excellent pear, raised from seed of the Winter Nelis, by Dr. Henry Reeder of Seneca County, N. Y. The tree is hardy and vigorous, and an abundant bearer. The fruit is below medium in size, roundish obovate, regular, with an obtuse suture from stem to apex on one side, giving it a slightly flattened form; skin green, becoming yellowish, more or less overspread with thin russet; stalk long, set in a deep, narrow cavity; calyx stiff, open, in a distinct basin; flesh buttery and melting, slightly vinous, musky, rich, "very good." Ripens in October.

Fig. 157.—*Ansault.*

Ansault (fig. 157.)—This new and delicious variety, more commonly known by its long and impracticable name, *Bonne du Puits Ansault,* originated on

the grounds of Andre Leroy, and has for some years been fruited by Messrs. Ellwanger & Barry of Rochester, N. Y. The fruit is rather below medium in size, short obovate, sometimes slightly pyriform; skin a little rough, pale greenish yellow, thinly russeted; stalk short, in a narrow, deep-ribbed cavity; calyx small, closed in a deep, narrow basin; flesh white, fine grained, juicy and melting, with a peculiar, sweet, slightly vinous, excellent flavor. It ripens in September.

BEURRE SUPERFIN (fig. 158.)—This large and excellent pear, although in cultivation many years, deserves wider attention from the many fruit growers who are but little acquainted with it. It originated in France. The fruit is large, short pyriform; skin greenish becoming yellow, often with a red cheek, and with more or less russet; stalk fleshy at insertion, and set on the acute neck; calyx small, partly closed, in a small, deep-furrowed basin; flesh buttery and melting, very juicy, with a rich and somewhat brisk flavor; in quality "very good." Ripens in October.

Fig. 158.—*Beurre Superfin.*

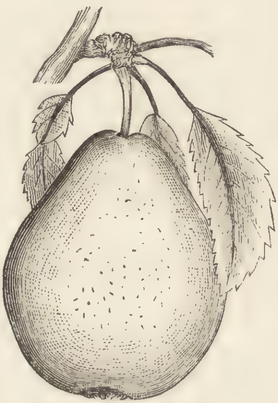

Fig. 159.—*Wilder.*

WILDER (fig. 159.)—This is one of the best of the celebrated new sorts raised by B. S. Fox of San Jose, Cal., and is valuable as a keeper, remaining in good condition till February. It is rather large in size, obtuse pyriform (Diel shaped), rich yellow, a little rough, often slightly reddened in the sun, with numerous dots, and slightly netted with russet; stalk short, in a small cavity; basin shallow, ribbed; flesh light yellow, a little granular, melting, with an exceedingly sweet and excellent flavor; "very good" or "best." It may be smaller when grown east, but will probably lose none of its flavor. Fine specimens have been received by us in different years through Messrs. Ellwanger & Barry.

THE BEAN CROP AND ITS TREATMENT.

By F. P. Root, Monroe County, N. Y.

THE BEAN is one of the most valuable vegetable products of our country, not so much for the extent of its production as for its value as a substantial article of food. It is more nutritious than any of the cereals, and always commands a higher market price. The consumption of beans in the United States has largely increased since the potato has become so uncertain a crop, and since the laboring man has found it much cheaper and an excellent substitute for that almost indispensable vegetable. The production of beans has lately increased far beyond consumption, for we now export annually quite extensively to foreign countries. In some localities it has become one of the staple farm products, and has often been more remunerative than grain crops. In this section it has been, on many farms, a specialty in years past, and much attention has been given to the cultivation and handling of the crop. The thorough farmer who understands the business of bean growing will meet with success, and will find it a remunerative branch of farm husbandry under favorable conditions; but it is more liable to injury from neglect, or from imperfect soil, than most other farm crops.

The bean contains more mineral matter than any of the cereals, and thus requires a soil rich in the organic elements of plant food. According to analyses by Wolff, it contains 29.6 parts of ash in 1,000, while wheat contains but 17.7 parts; the bean contains 12 parts of potash, and wheat but 5.5 parts; of phosphoric acid the bean has 11.6 parts, wheat 8.2 parts; of lime the bean has 1.5 parts, while wheat contains but 0.6 parts. Thus it will be seen that a strong soil is necessary to its production, and that it is more exhaustive than the wheat crop. The best kind of soil is found by experience to be a uniform calcareous loam. A sandy gravel loam will produce a fine sample, but a clay loam will usually afford the best yield. Other soils, if made mellow, will furnish fair crops, but heavy soils are liable to produce a poor quality by uneven ripening. Mucky soils usually produce too much vine, and a poor yield is the result.

Common barnyard manures are beneficial, but should be applied sparingly, so as not to produce an overgrowth. Superphosphate of lime is also as beneficial to this as to any other crop. While a strong soil, in a good state of fertility, is necessary to produce a full crop it is not desirable to have a large amount of vegetable matter in the soil.

Preparation of Land and Planting.

An inverted clover ley, or sod of any kind, provided there are no tenacious grass roots or weeds to grow up and choke the crop, affords a good seed bed, but must be made mellow. The soil must be well worked, and

be made clean and mellow before planting. It should always be freshly worked and moist when planted, so that the seed may all germinate immediately. Fall plowed land well worked in spring up to seeding time will have the seeds of weeds killed, and make the crop easier to till than when plowing is done immediately before planting. The land in all cases should be well worked, and made very fine, not only for the benefit a crop always receives from a well-worked soil, but for the early and uniform germination of the seed.

Beans should not be planted till the ground is warm—usually a week

Fig. 160.—*Bradford's One-Horse Bean-Planter.*

or ten days later than corn planting—in this latitude, from the first to the fifteenth of June. Late varieties, like the late pea bean, should be planted by the first of June. The early pea and medium beans are better if the planting is deferred till June 15th. The pea varieties require half a bushel of seed per acre; the medium three-fourths of a bushel, and the marrows one bushel or even five pecks. Kidney beans, and other large varieties, require more seed, in proportion to the size of beans. The marrows, medium and pea varieties are those most used, and are most hardy and prolific.

The planting is done with a machine drawn by one horse, planting two rows at a time, usually 30 inches apart. After tbe land is finely harrowed, a light roller should be passed over, to make a smooth surface, so that the seed may be planted at a uniform depth, and in straight rows, to facilitate cultivation. The planting machine is balanced on one wheel, which drives the feeders, and is provided with different sized cups, to meet the requirements of the different sized beans, so as to plant the required quantity of each of the various sorts. It is held by handles like the plow, the holder driving the horse, and will plant some 10 or 12 acres per day. This machine is seen in fig. 160. The cost of this planter is $25, and it is manufactured by Whiteside & Barnett of Brockport, N. Y.

After-Cultivation.

As soon as the plants are up, and put out the second leaves, which is usually about ten days after planting, cultivation should begin. A cultivator is used much like the common one-horse corn cultivator, but the tooth point is of a different shape. It runs nearly flat in the ground, so as to cut the weeds without throwing the earth against the plants. Cultivation should be repeated as often as once every week till the vines begin to run and the blossoms are about to show. If weeds grow along the rows, they must be destroyed by hand hoeing; otherwise all can be done by horse cultivation. The ground must, however, be worked close to the rows without hilling. Beans should not be worked when wet; it causes a rust on the leaves, which is injurious to growth. No crop is more easily injured by neglect, and none pays better for nice, clean cultivation than this. Weeds and thistles, if allowed to grow, will overshadow the low-growing plants, and prevent them from filling the pods full, lessening the yield largely.

Harvesting the Crop.

This crop will mature in from sixty to eighty days after planting, the early varieties, such as mediums and early pea beans, of course in the shortest time. As soon as the pods and leaves change to a yellow hue, and before the pods are dry, the harvest should begin. Harvesting is done, in the old style, by hand pulling, bringing four rows into one of bunches; the stalks inverted, setting the tops on the ground, so that the pods receive the sun to dry them. A week or ten days is necessary to cure in good weather. It is of the first importance that they are dry before putting into a mow, for any moisture sufficient to cause fermentation will greatly damage the crop. On a small scale they are sometimes stacked around stakes driven into the ground, spreading straw around the stake, then stacking the beans around by putting the roots to the stake and the pods hanging on the outside, when they will cure even in wet weather. This is however thought too expensive for extensive field culture, and is not practiced in this section. The only advantage in it is the safety against injury from wet weather, but in ordinary seasons the risk

in drying on the ground is very small. If the weather becomes showery, so that the piles are wet through, they must be turned over, and if wet weather continues several days in succession, it becomes necessary to turn them as often as once in two days, so as to bring those pods which lie on the ground up to the surface, where they will receive air. In this way they can be saved through several days of wet weather, without serious injury, but if allowed to lie on the ground unmoved when wet, they will be injured. Seasons of unfavorable weather at bean harvest time are quite rare, and little trouble is experienced in curing them. When farmers have scaffold room or airy places where they can be spread, beans may be stored when somewhat damp, but when put into mows they must be dry, and all green pods well cured, or the crop will be damaged by stained berries.

Recently the expense of harvesting has been lessened about one-half by the use of harvesting machines. Several different machines have been constructed, though all use the same principle of cutting the stalk an inch or two below the surface of the ground. This is done by means of a sharp steel share drawn diagonally, and attached to standards and a frame

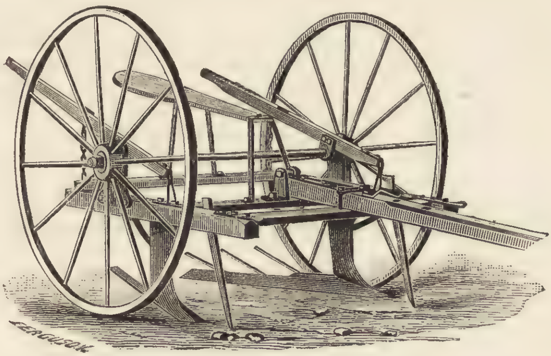

Fig. 161.—*Bradford's Bean Harvester.*

carried on wheels and drawn by two horses. The horses travel between the rows, outside of the two rows which are being cut and brought into one row behind the machine. The driver rides and regulates the depth of cutting by means of a lever. This is necessary to conform to the surface of the ground. The beans, after being partly cured are pitched into piles, bringing four rows into one row of bunches, in order to allow a team to pass between in loading. Beans when thus harvested dry out sooner than when pulled by hand, and if wet by rains are turned quite as easily.

A complete and successful harvesting machine is patented and manufactured by Wm. Bradford, Brockport, N. Y., a cut of which is seen in fig. 161.

It has two cutting blades which run forward obliquely just beneath or at the surface, each one cutting a row, the blades being long enough and having sufficient spread to allow for any variation in the row. This machine will harvest 10 or 12 acres per day, and will require the labor of three or four men at the same time to put them in piles for loading. The price is $50. In bunching the beans for drawing in, the piles are made only large enough for one forkful each, usually from 10 to 15 feet apart, according to the growth of the plants. They are pitched with a common barley fork having long wooden tines, which are run under the bunch carefully, to avoid shelling. A one-horse hay-fork is often used to unload, as they are heavy to pitch by hand. One team will draw into the barn 8 or 10 acres a day, although it will not do to draw them in early in the day when there is dew. The rows of bunches when four rows of beans are put together will be ten feet apart, between which the team can be driven, and two rows on each side pitched on as the team passes along. The rows usually need turning over to dry the bottom, in doing which the two are brought nearer together to make more space for the team to pass. Mr. Bradford is also the inventor and manufacturer of the cultivator used. These machines have been long in use, and are believed to be as perfect as any to be found.

The threshing of beans may be done in the same way as that of wheat or other grain, and at about the same expense—by hand labor with a flail; or horses, by treading on a floor, or by machine. A bean threshing machine is in common use, manufactured at the Hall Threshing Machine Works in Rochester, N. Y. The machine is similar to the grain threshing machine, except that the cylinder has a covering instead of open bars, and runs at a low speed, and has round teeth, which will not split the beans. A fair crop of beans should yield from 20 to 30 bushels per acre; sometimes more, but often less when seasons are not favorable or when not well tended.

Preparing the Crop for Market.

When the crop is threshed and winnowed, it is ready to go to the dealer, who prepares and barrels the beans for market. If the crop were sent to the eastern market in the condition which the farmer with his common mill leaves them, very few lots would be marketable as of first quality. Much of the profit of bean growing depends on the skill of the dealer in fitting them for the eastern market. Our dealers ship none until they are fitted to go into the baking pan or soup pot in perfect order, for such only will pass as first quality, and command the highest price. Fixtures and mills are necessary to clean from them all dust and dirt; to separate and grade the different sizes; to screen out split beans and foreign seeds, and to separate all discolored beans. A mill in use for screening and sizing them, and separating splits, is manufactured by Whiteside, Barnett & Co., Brockport, N. Y., a cut of which is seen in

fig. 162. The company also manufactures a planter and a cultivator for beans, which are much in use. Their cleaning machine is indispensable, for no sample is of first quality until it passes through this operation.

Fig. 162.—*Machine for Screening and Separating Beans.*

After this, if any are discolored, they may be picked out by hand. To facilitate this work the beans are run upon a slow moving canvas, when boys or women are employed to pick out all imperfect ones as the beans pass over and fall into packages. Every season some careless farmer has damaged beans, and in wet seasons crops are sometimes injured even before harvesting. The expense of picking is 10 to 15 cents per bushel. The poor beans are sold for feed.

Domestic animals, excepting sheep, have not a natural relish for beans, but when educated to it, they often become fond of them. When boiled or steamed and mixed with meal or bran, hogs will fatten faster on the mixture than on corn or meal alone. They are worth as much as corn for feeding, and are worth more when cooked, for keeping hogs. No fodder is more valuable than bean straw. It is eaten with a relish by sheep, cattle or horses, and being a laxative food is very desirable to be fed with other dry fodder in winter. Its value per acre is nearly equal to cornstalks, though much less in bulk.

A New Invention.

It is well known that bean soup has become a common dish in the course at nearly all our public eating-houses, but it is rather unsightly when filled with the skins or hulls of the beans. To avoid this, and to make a finer article for this dish, and also to make a finer article for other modes of cookery, a process of skinning or hulling the bean has been in-

vented. Messrs. A. B. Raymond & Son, Brockport, N. Y., who are extensively engaged in the bean trade, have invented a machine (and applied for letters patent) which promises to be of value in preparing this valuable esculent much better for culinary use.

THE BEST ROSES AND THEIR CULTURE.

BY HENRY B. ELLWANGER OF THE MOUNT HOPE NURSERIES, ROCHESTER, N. Y.

AS WE ARE EACH YEAR ADDING NEW SORTS to our list of varieties, and are also making some occasional discoveries and improvements in propagation and cultivation, it follows that our selection of kinds and our treatment in culture will vary somewhat from year to year, as new varieties appear to take the places of old favorites, and we have knowledge of improved methods for the care of them. Reversing the order of our heading, we will first offer a few brief suggestions regarding the general culture suitable for hardy Roses, and afterwards, at some greater length consider what varieties can most satisfactorily be grown by the general public.

The first requisite is the selection and preparation of a suitable place for planting. This is very important, as all that follows depends upon the care used in this first step.

To begin with, then, choose the best place you have in the garden, a place where you can offer sufficient protection, by means of hedges or board fences, from bleak sweeping winds. When fences are used, their general ugliness can be most appropriately clothed by Roses themselves. A warm, sunny position is also requisite; if so situated that there is an exposure to the morning sun and the hot rays during the afternoon are in part or wholly shaded, all the better, but a certain amount of sunlight is as essential to a Rose's welfare as to our own, though many of us do not show our appreciation of the blessings of sunlight as gratefully as do our roses. Besides scattering them through our gardens, Roses may be made very effective planted in borders about our lawns, either individually or in groups, and also planted in beds on the lawn. When the latter is done we may, with great advantage, depart from the usual custom of growing the plants in bush form, and resort to what is termed the pegging-down system, as shown in fig. 163.

In this case the mode of procedure is quite simple. Having planted our Roses—for this purpose those on their own roots are preferable—we allow them to grow the first season in the usual way; the following autumn or spring, the short and weak shoots are entirely cut away, and the long ones carefully bent down and fastened to the ground by means of

pegs, or where more convenient, or preferred, they may be tied to stakes. Occasionally it happens that there is a hard stiff shoot which will crack or break near the ground, but if the bark on the underside continues

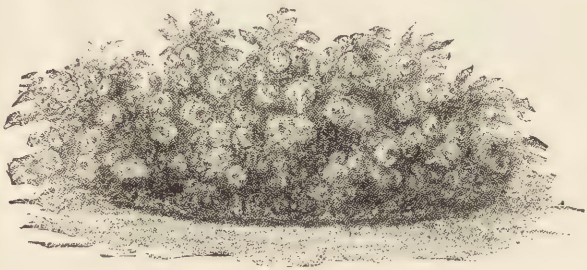

Fig. 163.—*Bed of Roses Pegged Down.*

whole this is generally of no consequence, as flowers will be produced, as well as though the shoot were uninjured.

Every year the pegging down must be repeated, the old shoots being cut away, and the new ones, which have come up during the summer, laid down in their place. The great advantage of this system over the ordinary practice of growing in bush form is the immense quantity of flowers produced, thus giving a magnificent appearance on the lawn, and affording all the cut flowers desired for household use.

SOIL.—Roses will do well in any ordinary garden soil that is free from any standing water and well drained. Where there is too much clay, the soil can easily be made sufficiently friable by the application of wood and coal ashes, lime, stable manure, etc. Where, on the other hand, a soil is sandy or too light, we need to work in clay, muck, leaf mould, &c., to obtain sufficient body.

Pruning is best done during November or March, though to secure a good second crop of flowers in the autumn, it is also necessary to prune immediately after the first flowering is over with.

MANURES.—In regard to this important portion of cultural operations, we would say there must be a generous application if we expect a generous yield of flowers. When Roses are planted in the spring, if the soil is ordinarily rich, it will be better not to dig in much manure about the roots, but rather apply it as a surface dressing. This will at once be nourishing, keep the roots cool, and prevent suffering from the drouths of summer. The following autumn, say in November, after the Roses have been planted, there should again be applied as a mulching a free application of stable manure, which may be dug in the next March. We find cow manure the best fertilizer, on the whole, that we have tried, though all kinds of stable manure are excellent, as are also bonedust, soot, guano, &c. For

full directions regarding this and kindred subjects we refer to the several excellent works on Roses.

With these few cultural hints, we proceed to a consideration of what are the best hardy Roses for general cultivation. We mean by this a list for beginners in Rose culture and the general public, naming those varieties which are most certain to succeed, and which will give the most generous return in profusion of flowers, fragrance and beauty. A perfect Rose therefore, for general cultivation should excel in the following particulars, and in the order named:

1. Beauty of color—as that which first attracts us to a Rose.
2. Beauty of form.
3. Fragrance—deprived of this, no Rose can be perfect.
4. Profusion and continuity of bloom.
5. Vigor and healthfulness of growth.

Let us consider at some greater length these several qualities essential to a perfect Rose. First—As regards color, we like something decided and pronounced, or else of great delicacy and softness and, withal, as durable as possible. The varieties differ very greatly in this respect. For example, Pius IX, a well-known old Rose of splendid habit, very seldom is seen of a clear color; the sun fades it almost immediately after the flower expands, and a dirty purplish shade of Rose is produced, anything but pleasing. La Reine, Giant of Battles, and others are likewise affected, though in less degree. Some, like Abel Grand and General Jacqueminot, are quite permanent, lasting oftentimes till the petals wilt and fall. Above all things, therefore, we want our colors pure and steadfast.

Form.—In form the Rose shows almost as much diversity as in color. We have globular, cup-shaped, imbricated and quartered Roses, besides many modifications of these forms. The globular Rose, as shown in Alfred Colomb, is the finest of them all, but the others are very pleasing in their variety, and we should not wish to be confined to the one type. The quartered or flat form is the most objectionable, though there are very many lovely Roses of quartered or flat shape, such as Caroline de Sansal, Baronne Prevost, &c., which are large, full, and even symmetrical. Shirley Hibberd in his excellent work on Roses, places form before color. This may be right in an exhibition box of Roses, but not as judged from our standpoint; however, it shows the very great importance of excellence in form, without which a Rose cannot stand very high in the scale.

Fragrance.—Did one ever think what we should lose were our Roses deprived of their sweet odors? Why, there would at once be a vacant throne, with no Rose to hold a queenly sceptre, and the strife of Dahlia, Camellia, Lily, Gladiolus and Rhododendron for supremacy would have no check, no limitation. Among all the delightful perfumes exhaled by the Lily, Heliotrope, Daphne, Jasminum, &c., none yield such delicate, sweet-scented odors as La France and Louis Van Houtte give us; they are alike supreme in beauty and fragrance.

PROFUSION AND CONTINUITY OF BLOOM.—This is also a very important feature. There is no doubt we have altogether too many kinds of so-called Hybrid Perpetuals, which though excelling in many other qualities, are lamentably deficient in this. They are perpetual in name only, and do not yield a sufficient number of flowers; they therefore should give place to true perpetual varieties.

VIGOR AND HEALTHFULNESS OF GROWTH.—Last and scarcely least, we look for a strong constitution. Varieties subject to mildew, like Caroline de Sansal, Prince Camille de Rohan, &c., have our commiseration as well as our regard; while weak or slow-growing varieties, like General Washington, Giant of Battles, La France, &c., we unfavorably contrast with the exuberant, healthful growth of such sorts as John Hopper, General Jacqueminot, Baronne Prevost, &c.

With these preliminary remarks, we submit a table, placing in order of merit the best hardy Roses for general cultivation. With the single exception of climbing Jules Margottin, we have not contemplated the admission of new varieties of the past four years. Some of them, no doubt, will be worthy a place in the list, but it takes time to thoroughly test a

Fig. 164.—*Alfred Colomb.* Fig. 165.—*Madame Victor Verdier.*

Rose, and we wish to make this list as thoroughly reliable and nearly perfect as it is possible for such a list to be.

We have selected the following means of determining the comparative merits of different varieties: Taking five qualities named in the order of their importance, we assigned the following number of points to each: Color, 24; form, 22; fragrance, 20; freedom of bloom, 18; vigor and healthfulness of growth, 16; making a total of 100 points for a perfect Rose.

Where two or more varieties resemble one another, we have only re-

tained the superior sort as a contestant; thus Ferdinand de Lesseps and Maurice Bernardin are thrown out as being similar, but inferior, to Charles Lefebvre.

This gives a list, therefore, of quite distinct sorts; those which are nearest alike being Alfred Colomb (fig. 164) and Mme. Victor Verdier (fig. 165) at the head, and they are sufficiently dissimilar to make both essential, even in a very limited collection.

We have given the shade of color in case any one should desire to select from this list with reference to having only a few sorts quite distinct from each other in tint; but as already mentioned, Roses vary almost as much in form as in color, and we may have two kinds with precisely the same shade, yet strongly differing in every other respect and therefore entirely distinct. The list runs as follows:

Thirty of the Best Hardy Roses for General Cultivation.	*Color.*	*Form.*	*Fragrance.*	*Freedom and continuity of bloom.*	*Vigor & healthfulness of growth.*	*Total.*
Maximum number of points,	24	22	20	18	16	100
1. Alfred Colomb, crimson,	24	22	19	14	13	92
2. Mme. Victor Verdier, crimson,	24	21	19	14	13	90
3. John Hopper, carmine rose,	24	20	14	16	16	90
4. General Jacqueminot, velvet crimson,	24	16	17	17	16	90
5. Countess Cecile de Chabrillant, pink,	23	22	17	13	14	89
6. Abel Grand, glossy rose,	23	20	15	16	15	89
7. Marie Baumann, carmine crimson,	24	22	18	14	10	88
8. Charles Lefebvre, deep crimson,	24	21	16	14	13	88
9. Francois Michelon, carmine rose,	24	21	15	15	13	88
10. La France, silvery rose,	24	22	20	18	3	87
11. Marguerite de St. Amande, bright rose,	24	20	12	16	15	87
12. Climbing Jules Margottin, carmine pink,	24	19	14	14	16	87
13. Duke of Edinburgh, bright crimson,	24	17	15	15	15	86
14. Baronne Prevost, rose,	23	14	17	16	16	86
15. Louis Van Houtte, maroon,	24	21	20	14	6	85
16. Paul Neyron, rose,	22	19	13	15	16	85
17. Anne de Diesbach, carmine,	24	16	12	14	15	81
18. Mme. Boll, carmine rose,	24	21	12	8	15	80
19. Prince Camille de Rohan, dark crimson,	24	18	14	12	10	78
20. Countess of Oxford, carmine red,	24	22	4	14	13	77
21. Caroline de Sansal, rosy flesh,	23	15	12	14	13	77
22. Mme. Alfred de Rougemont, white,	20	16	14	18	9	77
23. Peach Blossom, pink,	22	16	10	12	13	73
24. Coquette des Blanches, white,	23	10	8	18	12	71
25. General Washington, reddish crimson,	20	18	4	17	8	67
26. Marquise de Castellane, carmine rose,	24	19	2	9	10	64
27. Baroness Rothschild, silvery pink,	24	21	2	12	4	63
28. La Reine, rose,	15	12	10	12	14	63
29. Etienne Levet, carmine red,	24	20	2	10	6	62
30. Mdlle. Eugenie Verdier, silver rose,	24	20	2	8	7	61

A list of this kind would not be complete without mention of some summer Roses. Though blossoming but once a year, some of them, no-

tably the mosses, are so beautiful as to be essential to a Rose garden of any size or pretentions. We name the following as the best: For climbers, Bennett's Seedling, Baltimore Belle and Queen of the Prairies. We have also a new race of climbing Hybrid Perpetuals, which promise to be valuable, but are not fully proved. Among non-climbers the most desirable are Persian Yellow, Mme. Hardy, Mme. Plantier (fig. 166), and the following Moss Roses—Crested, Common Moss, Countess of Murinais and Salet; the latter, though less beautiful than the others, blooms freely in autumn, and would be quite valuable for that quality alone.

The selection or mode of electing varieties to a position in the above list is of course, arbitrarily done, but it has been carefully and we may say

Fig. 166.—*Madame Plantier.*

Fig. 167.—*La France.*

laboriously compiled; and though judges would differ more or less in the relative estimation of the different qualities which go to make up a perfect Rose, and the number of points which should be variously assigned, we nevertheless think it will be a serviceable guide. As will be seen from the table, we have no Rose which may be called perfect; our choicest sorts, excelling in some qualities, fall short in others; thus Alfred Colomb, which heads the list with 92 points out of a possible 100, is less fragrant than La France, (fig. 167,) more coy of its bloom than Coquette des Blanches, and does not have the lusty vigor of growth possessed by Baronne Prevost, but for the five qualities combined, no sort altogether equals it. Mme. Victor Verdier is a sister variety of nearly equal worth. Honest John Hopper, always steadfast aad true, comes third. Victor Verdier bears him much resemblance in color and general appearance, but has neither the fragrance nor vigor of constitution to be counted a rival.

General Jacqueminot, notwithstanding a lack of fullness and rotund form, is now one of our oldest, most generally known, and also best Roses for general cultivation. Clad in his rich crimson livery, he is still prepared to lead the van.

Countess Cecile de Chabrillant, (fig. 168,) possibly from the length of name, is a variety too much neglected and lost sight of. The flowers are not large but most beautiful, and are models of symmetry and grace. Let no one overlook her claims.

Abel Grand is another neglected, or

Fig. 168.—*Countess Cecile Chabrillant.*

Fig. 169.—*Marie Baumann.*

at least not well known, variety of the highest excellence, especially valuable in the fall of the year, when compeers otherwise equally meritorious are devoid of even semblance of bloom.

Marie Baumann! How difficult to depict her charms! Original and exquisite in all her features, she claims a choice position in every garden. There is no more beautiful variety than this in the entire list—fig. 169.

Charles Lefebvre (fig. 170) is an improved Jacqueminot in form and possibly color, though somewhat inferior in the other qualities. Only within a year or two have we in this country learned to appreciate this noble Rose.

Fig. 170.—*Charles Lefebvre.*

Fig. 171.—*Francois Michelon.*

Francois Michelon, (fig. 171,) a comparatively new sort, is rapidly gaining favor. It is a seedling from La Reine, bearing some resemblance to that well-known sort, but decidedly superior in color and form. Follow-

ing this is La France, the sweetest of all Roses; compelled to choose one variety, this should be ours. It is not only the most fragrant, but, with the exception of those Hybrid Noisettes, Madame Alfred de Rougemont and Coquette des Blanches, will yield more flowers during the year than any other sort named. It flowers so profusely that its growth is checked, every eye sending forth a flower shoot; it is, alas, not very hardy, being the most tender on the list, but though the tops are killed, it will start out again in the spring from the roots, the same as the Hybrid Noisettes.

Marguerite de St. Amande is a worthy companion of Abel Grand, furnishing a generous supply of autumn flowers.

Climbing Jules Margottin, besides being of more vigorous growth, seems, if anything, more beautiful than the old sort, from which it is a sport. It is well worth growing for its buds alone.

Duke of Edinburg is a bright colored Jacqueminot, which is saying all that is necessary.

Baronne Prevost, one of the best of the flat type, is a worthy companion of General Jacqueminot, and a model of vigor and health. It is the oldest variety known, having been sent out in 1842.

Fig. 172.—*Louis Van Houtte.*

Fig. 173.—*Anne de Diesbach.*

Louis Van Houtte, like La France, is but half hardy, and is also worthy of extra care. No other sort so nearly approaches La France in fragrance, and when planted in a bed together, the deep velvety maroon of the one contrasts most admirably with the delicate silvery rose of the other. It is shown in fig. 172.

Paul Neyron is the largest variety known, and although its size detracts from our notions of a refined Rose it is nevertheless a noble sort for any garden.

Anne de Diesbach, (fig. 173,) a true carmine, has its rivals of the same

shade, but her pure, lovely color has never yet been equalled by any of them.

Madame Boll is almost worth growing for its large lustrous foliage, but the blooms correspond in size and quality, only are too seldom seen after June blossoming is over.

Prince Camille de Rohan is a superb, very dark sort, quite well known.

Countess of Oxford (a magnificent carmine red, of the Victor Verdier type,) like Francois Michelon, is rapidly becoming popular, its chief defect being a want of fragrance, which it lacks in common with all the Victor Verdier race, such as Captain Christy, Etienne Levet, Lyonnais, Madame George Schwartz, Madame Marie Finger, Mdlle. Eugenie Verdier, President Thiers, &c.

Caroline de Sansal is a well-known, justly popular sort.

Madame Alfred de Rougemont and Coquette des Blanches are, all things considered, the best white perpetuals we have.

Peach Blossom, a comparatively new sort, seems to improve each year, and gives a new shade of color very desirable.

General Washington is one of the most widely disseminated varieties in this country, but it does not reach the maximum number of points in any quality. In color it is sometimes grand, but generally it has somewhat of a faded appearance, being quickly affected by the sun, and seldom is seen truly pure. The same may be said respecting form, sometimes superb, but generally seen with some defect, either a green centre, or irregular and not symmetrical. Of fragrance it is almost entirely devoid. It ranks very high as a free bloomer, but, like La France, this is at the expense of growth.

Marquise de Castellane does not always open well, but gives many large carmine-rose blooms of globular shape that are truly superb.

Baroness Rothschild has exquisite cup-shaped flowers entirely distinct from all others. It is unfortunately of stubby, short-jointed growth, and can only be propagated by budding or grafting. This will always tend to make it somewhat scarce.

La Reine is another well-known old Rose which we cannot yet afford to discard, though now surpassed by so many finer varieties.

Etienne Levet, another of the newer sorts, somewhat resembling Countess of Oxford, is rapidly finding favor, and had it but fragrance, would be assigned a higher position.

Mdlle. Eugenie Verdier, the last on the list, is certainly one of the most delicately beautiful colored varieties we have, but here again the lack of fragrance deprives it of a higher position.

MY EXPERIENCE WITH MARKET LAMBS.

By Henry Stewart, Bergen County, N. J.

IT WAS SEVERAL YEARS AGO that on a Saturday evening a large drove of sheep was stopped at my front gate, and the owner asked for pasture for it until Monday morning. He was willing to pay one cent per head per night, which, as there were about 1,000 in the drove, was a tempting offer. I bargained with the man to give him the pasture for the pick of seven ewes from the flock. On Monday morning I picked out the seven ewes, and was induced to make a purchase of 48 more, for the sum of $120. This transaction finally brought me into the business of raising early lambs for market. I had a flock of pure Cotswolds and some young ram lambs. It was in September, and a poor field was ready to be occupied. The ewes were turned into the field with three sturdy, well grown young Cotswold rams. The ewes were deep and long bodied Ohio native sheep, having a mixture of Merino and South-Down blood, as shown by the short wool and partly smutty faces and legs. I determined to raise some lambs, and set about it.

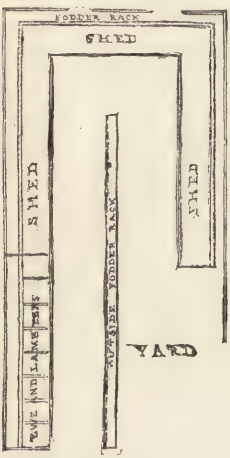

Fig. 174.—*Plan of Sheds.*

The flock ran in the field until the winter, when it was brought into a yard in which an open shed was built containing a feed-rack and a raised floor. The shed was 100 feet long, made of rough boards, 10 feet wide, 7 feet high at the back and 4 feet at the front, which was made with sliding doors, so that it could be half opened or wholly shut. A passage was made in the rear of the feed-rack, having several double doors. The shed (fig. 174) ran partly around three sides of a yard 100 by 44 feet; was fenced with boards, and was kept well littered with straw. A feed-rack was placed in the centre of the yard, into which oat straw and corn fodder chopped into 6-inch lengths was kept for the ewes to pick over. The flock was kept in this yard and shed during winter and spring, until the grass was up, being driven out twice a day to water in the large barnyard adjoining. The fodder rack running around the shed was made of strips $1\frac{1}{2}$ inches wide and one inch thick arranged so as to slope backwards 2 or 3 inches at the top, to keep the hay seed from falling

in the wool, and the strips were separated by spaces of 3 inches, to prevent the sheep thrusting their heads between the bars and rubbing the wool from their necks. Previous experience had taught me that unless the rack is made with a view to these contingencies, there is not only damage to the fleece, but a sheep might be occasionally fastened by the head in the rack, and become strangled. The form of the rack is shown in section at fig. 175—*a*, the sloping back; *b*, the front bars; *c*, the feed

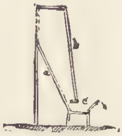

Fig. 175.—*Section of Fodder Rack.*

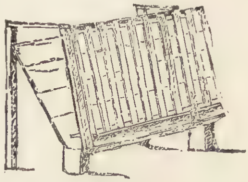

Fig. 176.—*View of Fodder Rack.*

trough. Fig. 176 is a view of the rack. The sloping boards at the rear served to keep the hay to the front of the rack, and also to carry the grain and meal down into the feed trough below. The only objection to this arrangement was that when the ewes were eating hay they would put their feet in the feed trough, but I have never yet found any feeding arrangement free from some objection, so long as animals cannot be taught good manners.

The section of the shed is given at fig. 177, showing the passage behind the trough and feeding floor. The floor of the shed was raised a foot above the level of the yard, to permit of the gradual accumulation of litter and manure, which in the spring was nearly two feet deep all over the yard.

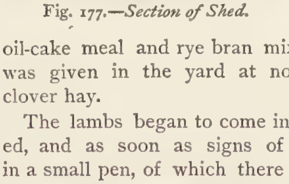

Fig. 177.—*Section of Shed.*

The feeding of the ewes before lambing was as follows: In the morning clover hay in the shed; at noon one pint each of mixed grain, corn, oats and buckwheat; occasionally this was changed to a similar quantity of linseed oil-cake meal and rye bran mixed in equal parts. Corn fodder or straw was given in the yard at noon; at night the rack was filled with clover hay.

The lambs began to come in February. Each ewe was closely watched, and as soon as signs of lambing were perceived she was placed in a small pen, of which there were eight, adjoining the feed shed and shown in the diagram (fig. 174.) These could be kept dark if needed and were divided by boarding 4 feet high. They were made warm by a small stove set up in the end of the passage. When the lambs were strong

they were turned out with their dams into the yard, and generally found the sunny side, where they gambolled and played.

As soon as the lamb was dropped the ewe was given about two quarts of warm oatmeal gruel, with a tablespoonful of sugar in it. The sugar tempted some to drink which at first cared little for it. The lamb was held up to the teats and helped to suck once or twice, if necessary, which was seldom. The ewes were fed more liberally after lambing, and selected ones that needed it were given an extra mess out of a shallow pan held for them.

In May some of the lambs were ready for sale. The first four sent down, in a box made of battens, to the New-York market brought me back a check for $40; and since then I have sold many as early as April, at 25 to 35 cents a pound, live weight. My sales the first year ran from $10, the first price, down to $4.50, when I stopped sending to New-York, and sold what I had left at home for $3.50, to the local butcher.

Occasionally a lamb would need attention to remove the gummy excrement which otherwise closed the gut, and would have caused death. For the first few days after birth, this should not be neglected. Having these warm pens, there were no chilled lambs, and the only lambs lost were two that crawled under the feed rack in the shed, and could not return. To prevent such an accident, every hole or space large enough should be carefully closed. The low roof of the shed gave ample protection against storms, and during very cold rain storms the sliding doors could be closed on the side where the rain beat in. Then the double doors on the rear of the shed are opened, to give plenty of ventilation.

As soon as the grass was long enough, the flock was turned out in the day, after having been fed with their allowance of grain or meal in the morning; and in the evening they had a similar allowance, which was half a bushel for the 55 head at each feed. This gave about one pound a day, but some ewes with twin lambs received an extra allowance, given in a shallow dish, as before mentioned. Constant mingling with the sheep had made them tame and easily handled, and this was found a great convenience in giving the required attention.

After experience led me to choose South-Down rams for the sires of the lambs, as the black-faced and dark-legged lambs are better liked and are more solid for the size than the Cotswold. I found Leicester ewes were an entire failure; several ewes died in lambing, and several lambs were lost in birth or pined away afterwards. Pure Cotswolds are too scrawny, and pure natives are too leggy to be desired in the market. After several years' trials of several different breeds, I consider the South-Down or the Hampshire-Down the best breeds for market lambs. By earlier coupling of the ewes, I have had lambs at Christmas, and have had them in market at Easter, but there is more trouble in looking after such very early lambs than is compensated by the price received. Rather than sell lambs before May, I would keep them and feed them to a greater

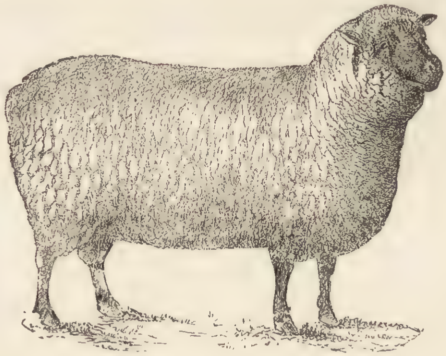

Fig. 178.—*Shropshire Ram—a Model Sire for Market Lambs.*

weight, because a thin lamb, although early, will not sell as readily or profitably as a large, heavy one, two or three weeks later.

After the lambs had been all disposed of, the ewes were fed for market, and before September had returned again, they had been sold to the butcher, having each given me a fleece and nearly every one a lamb, and realized an average advance of nearly 50 per cent. on their first cost. I have repeated this operation several times with about the same result, which is a profit of 150 per cent. on the investment, and a goodly lot of manure, which pays for all the trouble.

Fig. 179.—*Lamb.*

The points to be considered and prepared for are:

1. The selection of mature, well-grown ewes, with deep flanks, long bodies, and backs as broad as may be. A ewe with a gothic-arched back should be despised and rejected; she will be neither a milker, a good mother nor a feeder.

2. The selection of a good ram, a South-Down or a Hampshire-Down preferably, or a Cotswold of square, compact form, and short legs and deep brisket. One with brown legs and face would probably mark his lambs in the same way, and this would be an advantage.

3. The keeping of the ewes in constant good condition by regular and liberal feeding while breeding, and in feeding after lambing some sort of food that will maintain a copious flow of rich milk. It is better to feed the lamb through the ewe than to disorder it by giving food that is unnatural and unfitted for it.

4. To provide an airy, open shed, with a dry, capacious yard, and to avoid keeping the ewes too warm.

5. To provide separate pens for the ewes when lambing, and to keep them warm in cold weather by artificial heat if necessary.

6. To nourish the ewe with a warm drink after the lamb is dropped. A weakly ewe may be brought up greatly by means of a teaspoonful of gin in a pint of warm gruel, poured down with a drenching horn.

7. To see that the lamb is not injured by obstruction of the bowels, or from any inability to reach the teat and suck, or from a closed teat, when young and weak. The lamb should have a good meal within three hours after birth.

8. To suffer no check to the growth of the lamb, and to avoid stinting it by well meant but injudicious over-feeding with cow's milk or with solid food. If cow's milk is given, it should be from a fresh cow, and never in larger quantities than a quarter of a pint at one time. If bran or meal is fed, half an ounce to a lamb is enough to begin on, and an ounce is enough for a square meal. The danger lies in producing indigestion, scours, or costiveness, either of which will spoil the lamb, so far as profit as a market lamb goes.

9. To pack the lambs in light but comfortable boxes, or crates, when sent by express, which is best when not more than 100 miles from market.

10. To watch the ewe when the lamb is taken away, and to milk her if need be until the milk is dried up. Garget can be prevented with the greatest ease, but is difficult to cure without loss of the udder.

11. To begin to feed the ewe as soon as she is dried off, and get her to market forthwith.

12. To buy only thrifty ewes, and to buy them cheap, but not to buy them because they are low-priced, if they are not suitable. The best breeders and mothers will pay to keep over for several years sometimes. One ewe raised for me nine pairs of lambs in nine years, and died and was buried at the ripe age of thirteen years.

GOOD AND BAD PRUNING.

IN RIDING THROUGH THE COUNTRY, we often see young orchard trees injured in growth and deformed in shape by bad pruning. During the early part of the past season the owner of a fine orchard just coming into bearing, allowed it to become nearly destroyed by bad treatment. The man whom he employed seemed to think that the more he cut away the better. The trees were in full leaf, and had just begun a vigorous growth. At least one-half the foliage on the tops was hewed off. As an inevitable consequence, a serious and nearly fatal check was given to the trees.

In order to exhibit distinctly what we have so often urged on former occasions, we give representations of two trees, the one pruned early in spring or while the buds are yet dormant, and the other after the opening of the leaves. After one season's growth, the former appears like fig. 180; the latter as shown in fig. 181; the first with shoots 2 or 3 feet long; the latter with a growth of scarcely as many inches. This pruning or cutting back of the shoots is not of course usually performed on trees already set and established, but only at the time of trans-

Fig. 180.—*Spring Pruned.*

Fig. 181.—*Summer Pruned.*

a *b*

Fig. 182.

planting, for the purpose of rendering the top lighter at that time, the new shoots being thrown out the same summer. This result and contrast will not be exhibited the same on all kinds of trees, some of which are more checked in growth by early summer pruning than others. The cherry suffers most; the peach least.

The contrast is strongly shown on such young trees as have been budded the previous summer, and are cut back in spring to near the inserted bud. If the cutting back is done before growth commences, the appearance of the young tree by autumn will be as in *a*, fig. 182. If, on the contrary, the work is neglected till the leaves have opened on the stock, the bud, if it grows at all, will make a growth about like that shown in *b*, fig. 182.

A serious error is committed in pruning orchards when they do not need it. It sometimes happens that the tops of the trees become too thick, and a light and even thinning of the dense branches proves a benefit. This should always be done *from the outside*, and never at the centre of the head. Figs. 183 and 184 exhibit two trees, which have been treated by these two opposite modes. In fig. 183 it will be seen that the branches are not dense on the outside, but they have been trimmed enough to let in the light. Fig. 184 shows the too frequent error of thinning up from

Fig. 183.—*Well Pruned Tree.*

below, leaving a dense mass of foliage at the outside; and in extreme cases the tree is in as bad a shape as is shown in fig. 185. When such trees become old they are perfect specimens of deformity.

It should always be borne distinctly in mind, that if the small needless or supernumerary shoots are rubbed off when just starting to grow, very little pruning will be afterwards needed, except to

Fig. 184.—*Badly Pruned Tree.*

Fig. 185.

lighten the top in transplanting, and for letting in the sunlight from the outside when the top becomes too dense in after years.

A WESTERN CORN CRIB.

By Joshua Constable, Goodland, Indiana.

SIZE OF BUILDING, &c.—This corn crib building, as shown in the accompanying drawings, is 40 feet long, by 26 feet wide, with 18 feet uprights at the eaves, and a total height of 28 feet 7 inches from the ground to the ridge. In the centre of the building there is an alley or drive-way 40 feet long, by 10 feet wide; and on each side thereof a crib 40 feet long, by 8 feet wide, and about 19 feet in average height. Each crib will hold about 2,500 bushels, or the two together about 5,000 bushels of corn in the ear.

The centre alley-way is divided into three floors or stories in height; the lower or ground floor is 40 feet long, by 10 feet wide, and 10 feet 7 inches high; the middle floor is the same length and width, and 7 feet 6 inches high; and the upper floor also 40 feet long, by 10 feet wide, and 6 feet 6 inches high to under side of ridge. The ground floor of the alley or drive-way is enclosed at each end, by double sliding doors, with glazed windows therein; the middle floor has one sliding door, and two windows at each end, and the upper floor one window at each end, and a glazed skylight on the roof ventilator; so that the whole building is well enclosed, lighted and ventilated. The doors at the ends of the cribs at *d d*, figs. 186 and 187, are for feeding the corn to the horses, cattle, &c. Those on the sides of the cribs at *c c*, figs. 186 and 188, for introducing the shafting or tumbling rods from the power to the sheller, and for feeding; and the openings in the partitions, between the alley-way and the cribs, at *B B*, fig. 186, for shoveling the corn into the shelling machine.

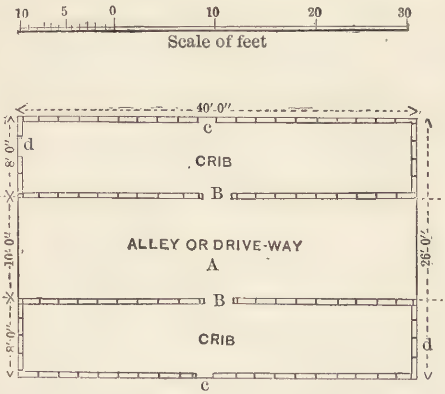

Fig. 186.—*Ground Plan*—A, *Position of Sheller;* B B, *Doors for Feeding Sheller;* d d, *Doors for Feeding to Horses, &c.;* c c, *Doors for Shafting and Feeding.*

Filling the Cribs.—The corn, as picked in the field, is brought on to the ground floor of the alley or drive-way, and thrown out of the wagons into the cribs on each side, through continuous openings, one foot ten inches square, between the uprights, just under the middle floor at *e e*, figs. 187 and 190; 2,800 bushels may thus be thrown into the cribs through these openings; then about 700 bushels can be thrown from the wagons through the four outside upper doors, on each side of the cribs (see fig. 188); and the remaining 1,500 bushels must be thrown on to the middle floor of the alley-way, through the doors at each end, and up through the well-hole in the centre of the middle floor at *h*, fig. 190; and then these 1,500 bushels must be thrown over into the cribs through continuous openings just under the upper floor at *e e e e*, figs. 187 and 190.

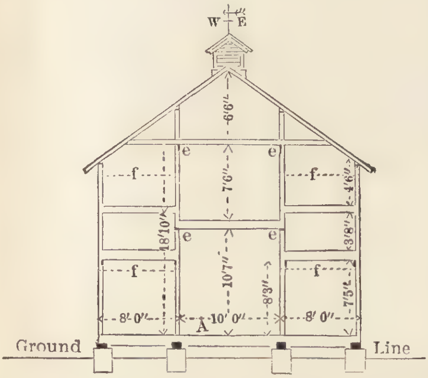

Fig. 187.—*Transverse Section*—A, *Position of Sheller*—e e e e, *Openings for Filling Cribs;* f f f f, *Iron Wire Ties.*

Position of the Shelling Machine.—The shelling machine is placed on the ground floor of the centre alley or driveway, at *A*, figs. 186, 187 and 190. The power, which is worked by eight horses, is placed outside, on either side of the building, for which a space of about 50 feet distance therefrom is required. The rods or shafting from the power to the sheller pass through the middle of the cribs, having in one of the cribs a moveable wooden trunk, 4 by 6 inches inside area, to enclose the rod or shaft, so as to permit the rod being run inside the trunk to the sheller when the crib is full of corn.

The corn is shoveled from the cribs into the hopper of the sheller through the openings, 2 feet 10 inches wide, by 7 feet high, in the partitions between the cribs and the alley-way, at *B B*, figs. 186 and 190. The corn as shelled is carried by the machine up the elevator on to the middle floor of the alley-way; which will hold about 1,500 bushels, (the sides and ends being boarded up to retain the corn,) which is a moderate day's work for the shelling machine. When the corn in one crib is shelled out, the power must be removed to the other side of the building, to shell out the corn in the other crib.

Hauling to Market.—The shelled corn thus placed on the middle-floor of the alley-way, runs down as required, through four shoots, about

6 by 3 inches inside area, fixed about 10 feet apart in the middle floor, into empty wagons standing below, on the ground floor of the alley-way;

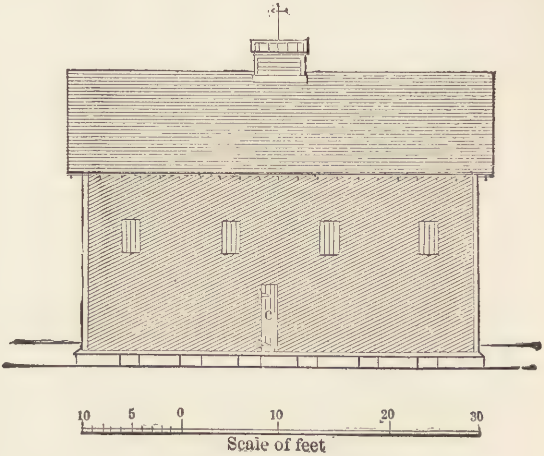

Fig. 188.—*Side Elevation.*

and thus the farmer can, with his own teams, haul his corn leisurely to market, without the expense of hiring or borrowing teams of his neighbors.

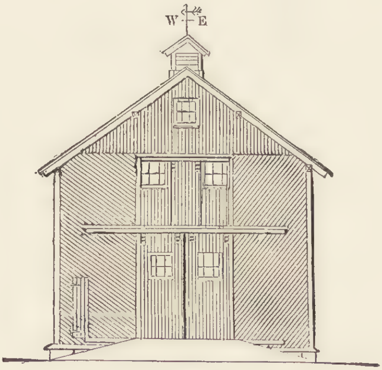

Fig. 189.—*End Elevation.*

General Storage.—The upper floor of the alley-way, would store 1,000 bushels of wheat or oats, seed corn, &c., or be available for other

storage; the middle floor serves as a corn granary, and thus saves the cost of a separate building. Two loads of hay, &c., could be sheltered in wet weather on the ground floor alley-way, till placed in barn or stack; and both the ground and middle floors would be available for wheat, oats, &c,, and other storage purposes, when not required in husking and

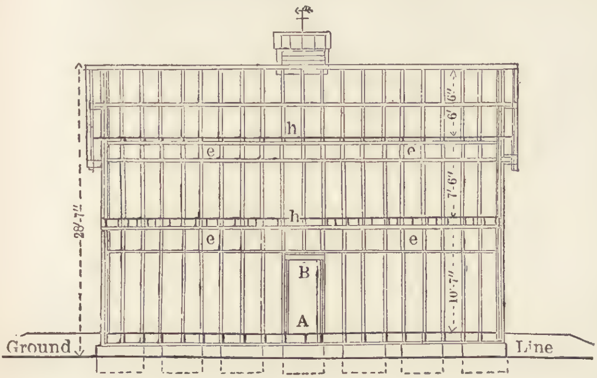

Fig. 190.—*Longitudinal Section (through Alley or Drive-way).*—A, *Position of Sheller in Alleyway;* B, *Opening to Cribs;* e e e e, *Continuous Openings for Filling Cribs;* h h, *Well-holes through Middle and Upper Floor.*

shelling; besides, if the crop of corn should be above the average, the last corn husked, to the extent of 1,000 to 2,000 bushels, may be stored temporarily on the ground and middle floors, thus making the building, in times of emergency, a crib for 7,000 bushels of corn in the ear.

Specifications.

Foundation Piers.—There are twenty-eight foundation piers. Twenty are 4 feet 2 inches long, and about 2 feet thick. The eight corner piers are 4 feet 7 inches long, with 1 foot return to each, and 2 feet thick; all built of cobble-stone masonry laid in mortar; the piers show 1 foot above the ground, and are put at a sufficient depth below, to insure a solid foundation; and have ventilator air openings, 1 foot 10 inches wide between each pier.

Sills, Plates and Uprights.—The ground sills are 4 by 8 inches, laid flatwise on the foundation piers, and bolted together at the splices and corners; plates, 2 by 6. Those at the eaves, and under the middle floor joists of the alley-way are in two thicknesses, equal to 4 by 6 in. Upright studs are 2 by 6, spaced at the sides of the building 1 foot 10 inches apart, and at the ends 1 foot 7½ inches apart. At the eight corners of the building the upright studs are double, and those for the partitions between the alley-way and cribs are in two heights.

Joists.—The joists for the crib floors are 2 by 12 inches, for ground and middle floors of alley-way, 2 by 10, for upper floor and ties to the rafters, 2 by 6; those for the middle floor are spaced 1 foot 2 inches apart, all others 1 foot 10 inches apart, and all securely spiked and nailed to the sills, plates, uprights and rafters; one tier of herring-bone studding or braces 2 by 2 in. are fixed between the joists of the middle floor.

Rafters.—The rafters are 2 by 4 inches, spaced 1 foot 10 inches apart, outside gable

rafters 2 by 6, the plates and ridge of gables outside, are increased to show 6 by 6.

Horizontal Ties, Posts, &c.—The horizontal ties, to which the close boarding of the gables is fixed, and for the door and window posts, lintels, &c., are 2 by 6 in.; the lintels, over the two openings in the partition between the cribs and alley-way at *B B B B*, figs. 186 and 190, are in three thicknesses spiked together, equal to 6 by 6.

Ties to Cribs.—The lower ties are 1 by 12 inches, fixed 7 feet 4 inches above the floor; the upper ties 1 by 8, fixed at 3 feet 8 inches between the two tiers of ties; all strongly nailed to the sides of each upright 1 foot 10 inches apart. The lower tiers of ties rest at each end on oak strips, 1 by 4 inches, let flush into the uprights.

Roof Shingling, Strips, &c.—The roof is covered with sawed pine shingles, fixed to rough strips or battens 1 by 4 inches, nailed on the backs of the rafters 2 inches apart, for air. The ridge boards are 1 by 6 in. dressed.

Flooring.—The flooring of the cribs is of one inch rough boarding; ground floor of the alley or drive-way of 2-inch plank in 8-inch widths; the middle and upper floors of the alley-way are of one-inch dressed and matched common flooring, in 5¼ inch widths. A well-hole 4 feet 2 inches wide and 10 feet long is formed in the centre of the middle and upper floors of the alley-way, at *h h*, fig. 190, and two movable joists and the flooring fitted to the well-hole on the middle floor, to be used when shelling, &c.

Strips to the Cribs.—The outside of the cribs is covered with dressed strips 1 by 4 inches, fixed 1¼ inches apart for air, nailed with two nails to each upright, at an angle of about 30 degrees, so as to brace the building and allow the rain to run off quickly. The inside, between the cribs and the alley-way is covered (except where lined on the middle and upper floors) with 1 by 4 in. rough strips fixed horizontally, with 1¼ inch air openings between each two strips.

Movable Shutters.—The continuous openings just under the middle floor of the alley-way, where the corn is thrown into the cribs, at *e e e e*, figs. 187 and 190, have movable open shutters, ten in number, 8 feet long, by 1 foot 8 inches high, made of 1 by 4 inch rough strips, with 1¼ inch air openings between each, and 1 by 4 in. oak ledges at the back, one ledge to come between and close to each upright. The ledges are 4 inches longer than the width of the shutters, so as to pass and drop behind the fixed oak strips at top and bottom, and be thus secured in position.

Boarding at Gables.—The upper part of the gable ends of the building is close-boarded with one-inch dressed and matched common flooring in 5¼-inch widths.

Oak Fillets.—Oak fillets 2 by 2 inches are spiked on the outer edge of the two outside ground sills, and to the two plates under the middle floor of the alley-way, to prevent the feet of the uprights from spreading outwards, and also to the posts of the two openings in the partitions between the cribs and alley-way, at *B B B*, figs. 186 and 190, to retain 2 by 4 in. battens, to keep the corn in the cribs; and oak fillets 1 by 2 to the posts of the four lower door-ways, to retain 1 by 4 battens to keep the corn in the cribs; and 1 by 2 oak fillets to the ten windows.

Oak Strips.—The strips at the top and bottom of the continuous openings through which the corn is thrown into the cribs, at *e e e e*, figs. 187 and 190, and under the ends of the lower tier of ties to the cribs, are of oak; those under the ends of the joists of the middle floor of the alley-way are 1 by 6 inches, and all the others 1 by 4. The ledges to the ten movable open shutters, and to the twelve small doors to the cribs, are also of oak 1 by 4.

Cant Boards.—The cant boards, to protect the tops of the stone piers, are 1 by 8 inches, dressed and fixed to 2-inch blocks nailed to the ground sills.

Angle Staffs.—The angle staffs are 1 by 6 inches, dressed and fixed to the corners of the building, nailed on over the strips.

Lining.—The side walls and ends of the middle floor for 3½ feet high, and also on the upper floor of the alley-way for 2 feet high, are lined or boarded with one-inch dressed and matched common flooring in 5¼ inch widths, to retain the corn, wheat, oats, &c.

Ventilator.—The roof ventilator has corner posts 4 by 4 inches, bottom plates 2 by 6, top plates 2 by 4, ventilator boards 1 by 8, all dressed; and covered with two glazed skylights 2¼ by 6 feet, and 2 inches thick.

LARGE SLIDING DOORS.—The large sliding doors, each 5 feet 1 inch by 10 feet 8 inches, at the ends of the ground floor of the alley or drive-way, are made of one-inch dressed and matched common flooring, in 5¼-inch widths, nailed together in two thicknesses, outside face vertical, inside diagonal; having a glazed sash 1 foot 7½ inches square, and 1⅜ inches thick, in each door. These doors are hung with strong iron suspending hinges and rolling wheels, fixed with bolts and nuts. The wheels run on an iron carriage bar 2½ by ⅜ of an inch, fixed with screws to a piece of oak 2 by 3 in., and protected at the top from snow, &c., by a hood of one-inch dressed boards top and front, and a one-inch dressed trough to guide the bottoms of the doors. The doors are fastened with an iron cross-bar and hasps and staples, and an iron ring for opening. The sashes are hung at the top with 3-inch iron butt hinges, and fastened at the bottom with a 3-inch iron hook and eye.

SMALL SLIDING DOORS.—The two sliding doors, one at each end of the middle floor of the alley-way, are 3 feet 2 inches wide, by 6 feet 6 inches high, and are made and hung the same as described in the preceeding paragraph, except that there are no sashes in these doors.

SMALL DOORS IN CRIBS.—The twelve small doors to the cribs are made of dressed strips 1 by 4 inches, with 1¼ inch air spaces, and oak ledges 1 by 4 at the back; the four lower doors are hung with 6-inch T hinges, and fastened by an iron cross-bar with hasps and staples.

SLATS.—The movable slats or battens (to stop the corn) at the two openings between the cribs and alley-way, at *B B B*, figs. 186 and 190, are 2 by 4 inches, with 1¼-inch air openings; and those at the twelve outside doors of the cribs are 1 by 4 inches, with 1¼-inch air openings. When corn is required to feed or shell, one slat or more is removed and the corn runs out.

WINDOWS.—The other six glazed sashes, three in each gable end of the alley-way, are also 2 feet 7½ inches square, and 1⅜ inches thick, and hung at the top with 3-inch iron butt hinges, and fastened at the bottom with a 3-inch hook and eye.

IRON TIES.—No. 9 iron fence wire ties, two tiers in height, are fixed across the cribs to prevent spreading.

TRUNK.—The trunk in the crib to protect the rod or shaft running from the power to the sheller is 8 feet long, with an inside area of 4 by 6 inches, made of two pieces 2 by 4 and two pieces 2 by 10, with a centre support 2 by 12 inches.

SHOOTS.—The four shoots in the middle floor of the alley-way, for filling the wagons with shelled corn to haul to market, are about 12 in. long and 3 by 6 in. inside area, made of one-inch oak, with a slide at the bottom, running on ⊢ shaped iron to prevent friction, and worked with an oak handle. They are fixed to the joists about 10 feet apart, and range along the centre of the alley or drive-way.

BOX.—The movable box around the elevator on the middle floor of the alley-way, to retain the shelled corn, is about 2½ feet square and 3½ feet high, made of one-inch dressed pine.

PLATFORMS.—The two platforms, one at each entrance to the alley or drive-way, are of 2-inch planking, laid on joists and sleepers 2 by 6 inches.

PAINTING.—The sides and ends of the building are painted two coats with white lead and linseed oil paint.

EMBANKMENTS, &c.—The approaches and platforms are embanked with earth, forming slopes for the wagons to enter the ground floor of the alley or drive-way, and the ground is slightly sloped from the building generally, to keep all dry around it.

ESTIMATE OF COST, BILL OF LUMBER, &c.

NOTE.—About 1-12th has been added below for waste, &c.

Fourteen 16 ft. 4 by 8 in. ground sills, 597 ft.,..............................

One 16 ft. 4 by 4 in. ventilator post, 22 ft.,......................................

Twenty-three 16 ft. 2 by 12 in. joists for cribs, cut to 8 feet length, 736 ft.,.....

Sixty 12 ft. 2 by 10 in. joists for ground and middle floor of alley-way, 1,200....

Sixty-eight 16 ft. 2 by 8 in. planking for ground floor of alley or drive-way and platforms at entrance thereof, 1,450,..............................

Seventy-two 16 ft. 2 by 6 in. plates, door and window posts, lintels, horizontal rails at gable ends, ridge piece, joists and sleepers for platforms, 1,152, ...

Fifty-four 18 ft. 2 by 6 in. outside upright studs and outside gable rafters, 972,	
Forty-two 24 ft. 2 by 6 in. joists to upper floor, and roof ties, and upright studs at gable ends, 1,008, ...	
Ninety 12 ft. 2 by 6 in. inside upright studs between alley-way and cribs, 1,080,	
Forty-five 18 ft. 2 by 4 in. rafters, 540......	
Fifteen 16 ft. 2 by 4 in. battens in openings for shelling, studding between joists, trunk, &c., 160, ...	
Twenty-three 16 ft. 1 by 12 in. lower ties in cribs, cut to 8 feet lengths, 368,..	
Twenty-three 16 ft. 1 by 8 in. upper ties in cribs, cut to 8 feet lengths, 245,....	
Total of above 9530 feet one inch thick, at $14, ...	$133.42
Seven hundred feet super one-inch rough boards for flooring in cribs, 700 @ $14,	9.80
Three hundred and eighty-five 16 ft. 1 by 4 in. roof battens or strips, and strips for inside of cribs, 2053 @ $14, ...	28.74
Three hundred and fifty 16 ft. 1 by 4 in. strips or battens, dressed, for outside of cribs, 1866 @ $15, ...	27.99
Twenty 16 ft. 1 by 8 in. cant pieces, ventilator boards, hoods to doors, dressed, 213 @ $16,..............	3.40
Twenty-five 16 ft. 1 by 6 in. angle staffs, at corners, top of hoods to doors, ridge boards, 200 @ $16, ...	3.20
Three hundred 16 ft. 1 by $5\frac{1}{4}$ in. common flooring, matched and dressed, in $5\frac{1}{4}$-inch widths (measured as 6 inches wide) for the middle and upper floors, and wall-lining of the alley-way, upper part of gable ends, sliding doors, &c., 2400 @ $18, ...	43.20
Fourteen 16 ft. 2 by 2 in. oak fillets on outside of ground sills, on plates under middle floor joists and openings from alley-way to cribs, 75 @ $17,........	1.27
One 16 ft. 1 by 8 in. oak for shoots in middle floor, 10 @ $17 ,...	17
Seven 16 ft. 1 by 6 in. oak strips (fence rails) at top of continuous openings under middle floor joists, and for shoots, 56 @ $17,..................	97
Forty 16 ft. 1 by 4 in. oak strips (fence rails) under ends of lower ties to cribs, top and bottom of continuous openings, ledges to doors, &c., 213 @ $17,....	3.62
Two 16 ft. 1 by 12 in. pine, dressed, for box round elevator, 32 @ $18.	57
Twelve 16 ft. 1 by 2 in. oak fillets to four lower doors of cribs and round ten windows, 192 feet run, @ 1 cent, ...	1.92
Thirteen thousand sawed pine shingles, @ $3,..........	39.00
Ten glazed window sashes, 2 feet $7\frac{1}{2}$ inches square $1\frac{3}{8}$ inches thick, @ $1.50,...	15.00
Two glazed skylights, 6 by $2\frac{1}{4}$ ft., and 2 in. thick, @ $2.50,..............	5.00

HARDWARE, &C.

Ninety-two No. 9 iron fence-wire ties to cribs about 20 feet long, @ 10 cents, ..	9.20
Thirty-two wrought iron bolts 5 inches long, $\frac{1}{2}$-inch diameter, with nuts and washers for splices, and corners of ground sills, @ 4 cents,..............	1.28
Four sets of iron suspending hinges, with rolling wheels, extra strong, for large doors of alley-way, @ $1.50, ...	6.00
Two sets of iron suspending hinges, with rolling wheels, for small doors, @ $1.25, ...	2.50
Sixty foot run iron carriage bar $\frac{3}{8}$ by $2\frac{1}{2}$ inches for suspending hinges, @ 3 cts.,	1.80
Ten 3-inch hooks and eyes for sashes, @ 5 cents,..........................	50
Ten pairs 3-inch butt hinges for sashes, @ 12 cents, ...	1.20
Six iron stay bars with hasps and staples for doors, @ 15 cents,...............	90
Four iron rings for large doors, @ 5 cents, ...	20
Four pairs 6-inch T hinges for lower doors of cribs, @ 30 cents,........... ..	1.20
Five kegs of spikes and nails, @ $3.25, ...	16.25
One hundred pounds white lead for painting, @ 9 cents,................. ...	9.00
Ten gallons linseed oil, @ 70 cents,.....	7.00
One gallon dryers, @ $1, ...	1.00
Fifteen bushels lime for foundation, @ 25 cents,.........	3.75
Six loads sand, @ 25 cents, ...	1.50
Total for materials,..	$380.55

LABOR.

Twenty-five days carpenter, @ $2, ...	$50.00
Twenty-five days assistant, @ $1, ...	25.00
Five days mason at foundation, @ $2, ...	10.00
Five days laborer at foundation, @ $1, ...	5.00
Total probable cost of the building,........	$470.55

PROBABLE EXPENDITURE, &c.—Many western farmers buy in Chicago the lumber cut and sawed exactly for the required scantlings. The crib building is then erected by the farmer himself, his sons or hired laborers assisting. As the whole is spiked and nailed together, without a single mortice or tenon, not much skilled labor is necessary. The materials will probably cost (as above) $380.55, and if one carpenter and a mason are hired, and assistance given them, the labor would probably cost $60, making a total cash payment of $440.55 for the whole building.

This amount might be further reduced about $45 by postponing the ground floor and large end doors of the alley or drive-way, and the two platforms at the entrance thereof, making an immediate total cash expenditure of $395 for the crib building.

Supposing the total cost runs up to $500, it would be equal to 10 cents per bushel for the 5,000 bushels stored.

This building, which is most substantially constructed, would, with a good coat of paint once every 5 years, one renewal of the roof shingling, and a few trifling repairs, last 50 years. The cost, with interest on the original outlay of $500 during that period, would be thus:

Original cost of building, say	$500
Interest thereon for 50 years at 5 per cent.,	1,250
Painting eight times,	100
Re-shingling the roof once,	65
Incidental repairs, say	175
Interest on the cost of painting, re-shingling and repairs,	410
Total,	$2,500

Which, for the 5,000 bushels of corn stored, amounts exactly to one cent per bushel yearly, while the charge at the railroad depot elevators is one cent per pushel per month for warehousing only.

HUSKING, &c.—An ordinary husker can easily pick and crib 50 bushels of corn daily; his wages this winter (1878) are $1 per day, and good board, lodging and washing, or 2 cents per bushel, with board, &c. The ordinary wagons used in the West have a box 10 feet long, 3 feet wide and 2 feet high, which holds 25 bushels of corn in the ear, or 50 bushels of shelled corn; as a bushel of corn in the ear occupies a space of 2½ cubic feet, and shelled corn 1¼ cubic feet; it is sold by weight at 70 pounds per bushel for corn in the ear, and 56 pounds for shelled corn.

COST OF SHELLING, &c.—The usual charge for shelling is one cent per bushel, or if in large quantities of 1,000 bushels and upwards at one time, a fraction less. From 1,200 to 2,000 bushels are shelled daily, according to the power of the machine and the length of the day. The owner of the shelling machine furnishes two teams of two horses each, and two men to work it, and the farmer also furnishes two teams of two horses each, and three or four men to assist—(for threshing wheat and oats the owner of the machine furnishes four horses and the farmer six horses; charge for threshing wheat 4 cents; oats, 2 cents per bushel)—and the farmer boards both men and horses, as the practice of having all the hired

laborers in the house to provide for, still prevails on most of the farms of moderate size in the western country, making the life of the farmer's wife and daughters one of hopeless misery.

CANARY BIRDS AND THEIR MANAGEMENT.

By Henry Stewart, Bergen County, N. J.

THE CANARY is one of the most agreeable of household pets. In figure, color and song it is unsurpassed by any domesticated song bird, and with good management its rearing may be made an agreeable, entertaining and successful recreation. This bird is known scientifically as *Fringilla canaria*, and its native home was originally in southern Africa and the adjacent islands of the Atlantic ocean. The Canary islands, which are sometimes supposed to be the home of this little bird, are not so in reality, as it is stated that these islands were stocked with the birds by means of an accidental shipwreck. Canaries have been common in southern Europe for more than 300 years, and were introduced from Italy into northern Europe and England. The wild canary, as now found in

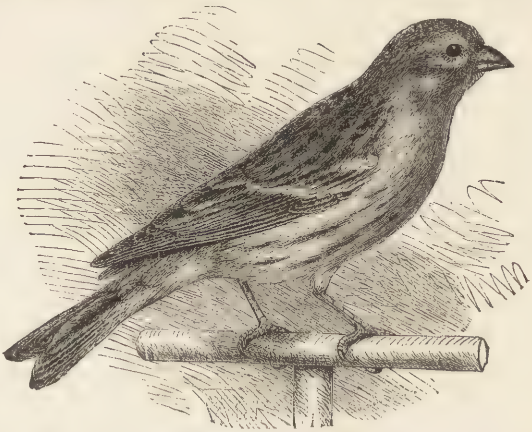

Fig. 191.—*Wild Canary.*

its original home, is an excellent song bird, with a sweet, soft, melodious note which is materially different and superior to that of the cultivated variety. It much resembles in size and form some of the tame varieties, but is green in color, with markings of a darker dusky shade. Fig. 191 is

a portrait of a wild bird brought by some sailors from the island of St. Helena, and exhibited in England in 1875. It may be stated at the outset that only the male sings, a singing hen being a rarity, and a failure as a breeder.

The cultivated varieties have originated chiefly in Germany, Belgium and England, where crossing and training have been practiced by professional breeders and fanciers for many years. By this crossing the form and coloring have been greatly changed, but it can hardly be said that the voice has been improved, although it has been increased in depth and volume. The most common variety both in England and America is the Belgian, an exquisitely graceful bird in its figure and movements; a delicate yellow buff in color, and having acquired, through many years of domestication and training, a greater degree of docility and tameness than any other variety. A perfect Belgian canary should be 7 or 8 inches in length, very slender and sleek, with long legs, sweeping tail, and long, slender neck; close in feathers, and with high shoulders, and a somewhat hunchbacked figure when it takes on a listening attitude, or when its attention is directed particularly to a strange observer. The position shown in the engraving (fig. 192) is very characteristic of this variety.

Fig. 192.—*Belgian Canary.*

An enormous business is done in Belgium in breeding, rearing, training and exporting canaries; and good birds bring a high price. A common price in New-York for a well bred bird is $10, and as high as $40 will be paid for a picked bird, or one imported to order. A high class bird is rarely seen in America, because canaries have not yet become a fancy here; but in England, where special exhibitions are made, from $60 to $100 is frequently paid for a bird with good points for mating.

The Belgian is carefully trained for singing; the trainers keep their young birds in small wooden cages piled on shelves, in rooms where a few of the best singers are intermingled with the young birds, as instruc-

tors. The training is usually done at night by the bright light of lamps. A good Belgian canary will sing most melodiously in the evening in a brightly lighted parlor, and especially when stimulated into song by the notes of a piano or other instrument.

The style of breeding common in Belgium, as shown in fig. 192, has been carried to excess in the Glasgow Don, a Scotch bred bird, which is excessively slender in form, and without the shoulder of the Belgian. This bird is very graceful in its outlines, is 6 to 7 inches in length, with a small flat-crowned head; long, almost serpentine, neck; narrow and long back; long, slender thighs and legs; and a slender tail curved forward, so as to give the bird the general contour of an arc of a circle, when in a listening attitude or vigorously engaged in song. The color varies from yellow, buff and flecked, to piebald yellow or piebald buff. The carriage of this bird is

Fig. 193.—*Yorkshire Canary.*

bold, free and saucy, if not somewhat pugnacious. This variety is rare in America, but is highly prized in Scotland, and among Scottish residents here, who frequently bring their favorite pets with them.

The Yorkshire canary, fig. 193, is a popular bird everywhere, and is the type of the most common variety, dividing the general favor with the Norwich canary, fig. 194. These differ very little except in color; the former is clear yellow, clear buff, or mixed yellow and buff; the latter

being orange, or buff mixed with green, or nearly all green. The Yorkshire should be a "straight" bird, long and stout rather than slender, with a full neck and throat; small, flat head; broad, square shoulders; broad, flat back; wings long and meeting at the tips; long, close and compact tail; stout thighs; without any frill on the neck, and of a pale

Fig. 194.—*Norwich Canary.*

sulphur yellow or light buff in color. The attitude is not so intrepid and saucy as in the foregoing varieties, but is docile, winning and entreating, and the temper is mild and yielding. This variety can be safely given the freedom of a room, and will make itself very much at home, retiring to its cage when that is brought down for it. It is a most desirable variety, and being less of a fancy than the Belgian, can be purchased at a reasonable price, $3 being a common figure in the New-York dealers' stores. The origin of the Yorkshire canary is said to be from a cross of the Belgian on the common mongrel or mixed kind. The Norwich is a high-bred sort, the principal object having been to procure and retain high colors more than any other peculiarity. The brilliant coloring of these birds however has been gained at the expense of other qualities, and has been the result of peculiar stimulating food, such as cayenne pepper mixed with yelk of egg; red beets, cochineal, saffron, annotto, carrots, madder

and other highly colored and flavored food. It has even been known that unscrupulous fanciers, ambitious of distinction, have resorted to artificial dyeing of the feathers, thus emulating some of the questionable practices of the horse jockeys and dishonest cattle and poultry showmen. On this account it is only proper to mention this variety without further detail, because in the amateur's hands it would soon return to its original inferior condition, and become very unsatisfactory property.

Among the less desirable or less noted varieties, except for the breeder, may be mentioned the Cinnamon canary, fig. 195, a drab, sober-colored

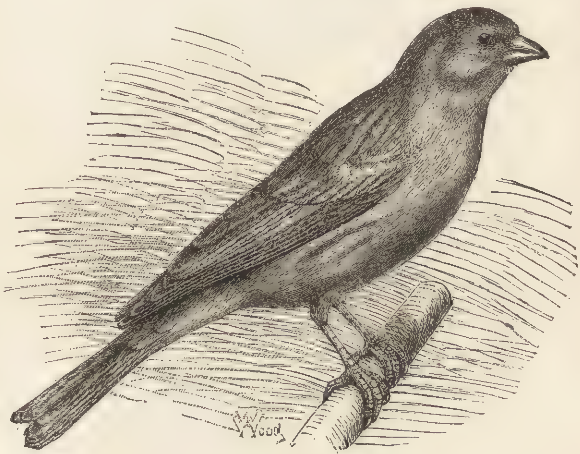

Fig. 195.—*Cinnamon Canary.*

sort, which is in request for crossing to deepen the color of the lighter hued kinds, or to produce the beautifully marked or pencilled feathers which clothe some of the cross-bred birds. This variety has of itself, however, some attractive qualities. The eyes are pink or pale red, even in the newly hatched young; the form is substantial, the color is not unpleasing, and the demeanor is so peculiarly mild, enticing and affectionate that the bird becomes much endeared to its owner. The color most desired in this variety is a deep orange brown, the exact shade being that of the finest qualities of cinnamon, brightened by a clear lustre. This color is evenly distributed over the plumage, light shades or markings being considered detractive. For the breeder there is no more desirable variety to work with than this; it can occasionally be found in dealers' collections in New-York, Philadelphia, Boston or Chicago.

Other varieties include the Gold-spangled Lizard, a popular English variety, handsomely marked, of a golden bronze green on the body,

spangled with yellow; the flight and tail feathers are black, but edged with golden yellow; the breast is well spangled, and the figure is stout and short, 5 inches being the usual length of a full sized bird; and the Silver-spangled Lizard, which differs from the preceding only in having the spangles of white instead of yellow.

The canary has been crossed with some English native finches, more particularly the Goldfinch and the Bullfinch. These are handsomely marked birds, but are desirable for nothing unless it be their brilliantly marked plumage. The cross-bred varieties are unknown here, and possess little interest for us.

Breeding and Rearing.

Success in pairing and rearing canaries depends chiefly upon the careful consideration of the peculiar disposition of the little creatures, which, notwithstanding their diminutive size, sometimes possess as much vice and mischief as much larger birds. When several birds of different sexes are kept together out of the breeding season, as the pairing time approaches, the males will make their own selection of mates, and will exhibit so much attachment for their self-selected partners that they will mate with no others. It is well, therefore, to keep the sexes separate and out of sight of each other until it is desirable to pair them. This should be done from November until January; the males, if many are kept, should be separated in squads of three or four in a cage, as they are quarrelsome, and often fight and injure each other. The hens, being

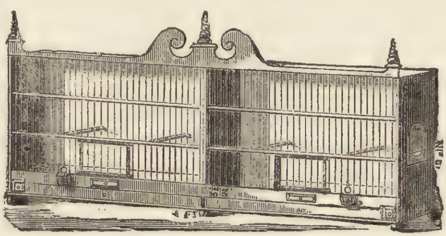

Fig. 196.—*Double Cage.*

peaceable, may be kept in large cages or aviaries without difficulty. Where but one pair is kept there is no need to separate them. The pairing time is in February or March; this depends upon the provision made for lodging the birds. If a warm room is furnished for them, the earlier season may be selected. Before the birds are paired, the male and female which are to be paired (two females may be given to one male) should be placed in their separate cages close together, to enable them to become acquainted and attached. Otherwise a sudden introduction may result in a quarrel and a fight. A double compartment cage (fig. 196) with a wooden

partition or a wired slide in the centre which can be removed at pleasure, is very convenient. This can be furnished with a nest box, (fig. 197,) hung to the wires, as shown at fig. 198, which represents a single breeding cage. Or two single cages with sliding doors (fig. 199) may be hung together and the male introduced to his mate or mates when the proper time comes. When the birds are paired they should be fed liberally on hard boiled egg, finely chopped, or rubbed through a coarse grater or sieve, mixed with crumbs of bread at least twenty-four hours old. Two teaspoonfuls of this is sufficient for a pair for one day. Every second day a small quantity of maw (poppy) seed or hemp seed, or the

Fig. 197.—*Nest Box and Nest.*

Fig. 198.—*Single Cage.*

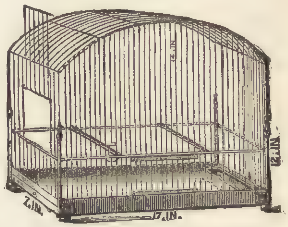

Fig. 199.—*Cage with Sliding Door.*

two mixed, should be given; millet and linseed may also be given as a change, but only in small quantities. After three days the nest should be provided. The lining for this is best made of the hair felting used for covering boilers; or of a piece of soft felt hat brought to a proper shape. A mould to form the nest may be made of a piece of wood turned or whittled to a half-rounded conical or half-egg shape, $3\frac{1}{4}$ inches deep and $2\frac{1}{2}$ inches in diameter. A handle may be fitted in the top for convenience of use. The felt should be cut into a circle of sufficient diameter, and four angular pieces cut out, as shown at fig. 200, to cause it to fit the hollow of the nest. The nest may be made of a small tin cup of the requisite size, viz.: 3 inches wide and $1\frac{1}{2}$ inches deep for incubation, and $3\frac{1}{2}$ to 4 inches wide and 2 inches deep for rearing the brood. The cut edges of the lining are

Fig. 200.—*Pattern of Nest Lining.*

sewed together the inner surface is torn or teased apart, and then pressed down into the nest with the wooden mould previously mentioned. The bottom of the nest or cup should be perforated with two holes, by which the lining may be secured with stitches to the nest box. The nest may be fastened to a strip of tin and hung in the cage to a hook; or it may be placed in the nest box. A section of a small cocoanut shell makes an excellent nest, of a good shape, and durable.

Some Persian insect powder should be sprinkled in the nest before putting in the lining, as a precaution against the parasites which are apt to infest the birds. Canaries will make their own nests, if some teased out wadding or short moss is provided for them, and some of this should be given to them even when the lining is prepared, as they instinctively want to take a hand in their house furnishing.

When the hen is observed carrying materials to the nest, a change of food should be given, as she is about to lay. Some brown sugar should be added to the egg and bread, and some green food, as water cress, mustard or rape, sprouted and grown in a plate of moist sand, in a warm window, may be chopped and given. As each egg is laid, it should be removed, until three are laid, when they are returned, and the hen is set. An ivory egg, or a "blown" egg shell is usefully employed as a nest egg. If the male bird destroys the eggs or troubles the hen while on the nest, he should be taken away, and returned only for an hour or two each day; the partition cage is found useful for this purpose.

During incubation, the hen should be fed as already mentioned, and this is continued until the young birds are six weeks old. The old birds prepare food for the younglings and feed them; the male taking his share with the hen in this labor. After fourteen days the hen will generally begin to lay for another brood, and a fresh nest should be supplied, along with nest material, else she will pluck the young birds. The male will then rear the brood, if the hen takes to a second nest. It is rarely that any trouble is experienced from misbehavior on the part of the male birds. In case neither of the old birds feed the young, they should be fed with food from the trough, rubbed up into a paste and given on the point of a quill toothpick. The natural manner of feeding is for the old birds to disgorge the contents of their crops into the mouths of the young. Often an old experienced male bird will, in this way, feed a young hen and teach her to feed the young as well. When the young birds are able to feed themselves, they may be removed into a separate cage and fed with the mixed egg and bread, and green food, until they are two months old and can crack seed well. A change of food should then be made, and the supply of egg reduced gradually. Washed sea sand, or finely crushed sandstone, washed in salt water, is necessary to be given; a piece of old mortar is also useful, and the floor of the cage should be freshly sanded at least once in three or four days. If the hen's claws become too long, and the feet foul, they should be washed and the claws

clipped with a pair of sharp scissors. It is well to do this before the hen is mated, as it prevents damage to the eggs during incubation.

Some of the high bred birds are very tender, and need unusual attention. After a little experience, good judgment will serve to find a way out of any ordinary dilemma as regards management of the broods, always remembering that over-feeding, cold and uncleanliness are the only serious causes of disease.

In breeding in an aviary, such as may be made by enclosing a sunny bay window, and in which a number of birds may be kept, a dozen hens may be mated with three cocks; and the birds will mate promiscuously. A branchy shrub will provide perches, and a few nests may be hung here and there. An orange or a lemon tree is the most desirable for an aviary and for nesting in. A window, if selected for this purpose, should have a southern aspect, and the enclosure should admit a plentiful supply of warm air. On cold nights a blanket or shawl should be hung about the window and against the enclosure. With this protection, any canaries, even the high-bred Belgians, will not suffer from cold even during severe frosts. Where artificial warmth is thought necessary, an oil stove placed under the floor of the aviary, with a tin pipe to conduct the hot air across the floor will be sufficient. The season of breeding should not be continued later than July, as moulting ought to begin soon after this period.

Every breeder of canaries should be able to make his own cages. Quarter-inch pine lumber, stained of a mahogany shade, by the use of a solution of bi-chromate of potash, is the best material for the smaller cages; larger ones may be made of three-eighths inch basswood cut from large trees, and as basswood admits of easy bending when soaked in hot water, many fancy shapes can be made of it. The wire used is brass or steel, and the tools needed are a pair of wire cutters, a pair of pliers, an awl a little smaller than the wire and ground to an even point all around, as a pin or needle is ground; a light panel saw, hammer, brads, screws, sandpaper, &c. When the wooden frame is made, the wires are cut of the right length and inserted in the holes by means of pressure applied by the pliers; the wires, being a little larger than the holes, are held by the pressure of the wood. The cages shown in the illustrations are easily made, and the sizes are marked on the engravings. When the cages are finished, the woodwork may be oiled and varnished with common copal varnish, or may be simply oiled. The bottom board of any cage should be made to draw out, and be provided with a knob.

THE TULIP TREE.—The Gardener's Monthly says that this fine ornamental tree is becoming extensively planted in many parts of the country, and adds that "one reliable nursery assures us that their sales of it during the past 20 years, for ornamental purposes alone, cannot have been less than 30,000 trees."

NOTES IN RURAL ECONOMY.

UNDERDRAINING IN WINTER.—We gave some directions on this subject in a former volume of RURAL AFFAIRS, and now present to our readers some additional suggestions:

The chief object in winter ditching is to avoid the difficulty of frozen ground, which some regard as impossible in a severe climate, but this difficulty is easily overcome if simple precautions are taken. Farmers who are hurried in spring and summer, and men who wish to obtain employment the year through, will both be benefited by performing what draining may be accomplished at this season.

The ground selected for the work should be dry, which is nearly always the case with soils in winter, the heavy soaking coming after the spring thaw.

Different farmers have their various modes for beginning a ditch, some saving labor by plowing a narrow land on the intended line, throwing the earth outward, and leaving a dead furrow where the ditch is to be, and repeating the operation once or twice more. Others prefer a smooth, level surface, and do all the digging by hand, or loosen up the soil with a subsoil plow, to be thrown out by hand. It is of course advisable to start either with a few furrows with the plow, or by digging first a foot deep before severe freezing weather sets in. After that the bottom of the ditch is kept from freezing by always leaving over night a *few inches of mellow earth in the bottom.* If this is well pulverized, it will be so good a non-conductor of heat that the hard earth on which it rests will not be frozen. If the soil is wet, it cannot be perfectly pulverized, and hence the importance of working in a dry soil, as already stated. The accompanying diagrams mark the depth of the frozen earth, by the shaded parts or slanting lines. As shown in fig. 201, if the ditch is cleared out, leaving a hard, smooth surface at the bottom, the cold air will settle in it, and while level soil is frozen down a foot, the bottom will be frozen to a depth

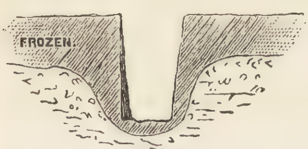

Fig. 201.

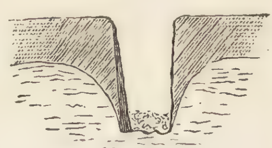

Fig. 202.

of from one to three inches, ranging with the depth and width of the excavation, and the coldness of the weather. The narrower the cut, the less it will freeze, on account of the heat imparted from the warm earth at the sides. Fig. 202 represents the small bed of pulverized earth

in the bottom, and the consequent protection which it affords from freezing, the shaded portions on each side showing the depth to which, in this case, the frost penetrates. The only precaution, therefore, to prevent the bottom from freezing over night, or during other absence of the diggers, is to loosen up the earth as the last thing before leaving, and the more finely it is broken the better. If the subsoil or ditching plow is used, it may be passed a few times for this purpose; if the work is all done by hand, the ditcher loosens up a mellow bed with his pick. When the work is resumed, the loose earth is thrown out and the work goes on as before. When the digging is completed, the tiles should be placed in position and covered to a small depth with the last fresh earth thrown out, and it may there remain till spring, when the remainder of the earth is thrown in. It will not do to leave the ditch open without placing the tiles in position, as freezing and thawing will partly fill it with crumbling earth. If laying the tile is carefully done, it may be commenced at the lower end of the drain, and the work extended upwards as the digging progresses in that direction.

Construction of Pig-Pens.—The following description is furnished by John I. Carter of West Grove, Pa.:

No animal that we feed is more sensitive to wet and cold than the hog. The evaporation of moisture from his unprotected skin, or a cold current of air against him, chills him to his serious injury. Hence a good winter pen should secure warmth, dryness and freedom from draughts.

A pen should be tight enough to keep it above freezing, and so arranged that the pigs will have no opportunity to get damp. Their bed should be as far as possible from the feeding pen, that no moisture may be carried from the trough to the bed. They should not be allowed to drop their manure on board floors, depending on frequent cleaning to keep the pen sweet, for it cannot be done. They must have a dry manure yard where a body of manure may readily absorb all urine and other moisture, and be kept sweet with earth and plaster.

The following plan will secure these ends: A single tier pen should be 22 feet wide (length indefinite)—the pen running east and west if suitable. On the north side (or middle) an entry 4 feet wide; next a trough and feeding floor 5 feet wide, with an inch to the foot fall for the hogs to stand on while feeding; then a manure yard 8 feet wide, with cemented bottom, one foot lower than the feeding floor. Back of this again is the sleeping pen, 5 feet wide, and floored like the feeding pen. A slight fall in this floor towards the manure yard will carry off chance moisture; and a narrow board will keep the bedding from working down. This arrangement affords every convenience for the pigs to drop their manure in the proper place, *i. e.*, the manure yard, in passing from the sleeping pen to the trough, and the same opportunity is offered on their return.

This pen can be divided into compartments of about 8 feet, separated by low partitions. A lifting gate will divide manure yards, and a large

door on each end of the pen will admit a wagon for cleaning out the manure. The eaves of the roof may run within 4 feet of the ground, as height of roof over the sleeping apartments is not required. A slid-

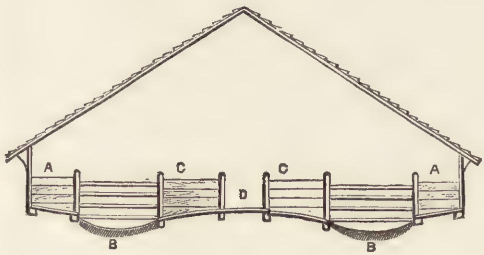

Fig. 203.—*Construction of Pig-Pen*—A A, *Sleeping Apartments*, 5 *feet wide*, 5 *inches fall*; B B, *Manure Depressions*, 8 *feet wide*, 1 *foot deep, with lifting gates*; C C, *Feeding Floors*, 5 *feet wide*; D, *Entry or Centre Alley*, 4 *feet wide. Partitions are* 3 *feet high*; *Entire width, as above represented for double tier of pens*, 40 *feet.*

ing window opposite these apartments will be convenient for putting in fresh straw. Skylights in the roof will increase warmth, and admit light. The arrangement of store-rooms, &c., can be made to suit taste, and a double tier pen would no doubt be most economical.

I might farther add that if the compartments were made 8 feet wide, then the lifting gates could be turned around and enclose either the sleeping or feeding pens, and thereby facilitate the shifting of the hogs from the different pens.

How to Cut Ice.—N. Atwell of Van Buren County, Mich., gives the following useful directions:

A good cross-cut saw is the most convenient tool to use. A good pair of ice-tongs is the best instrument with which to haul the cakes out of the water, and also to handle and load them. The cakes should be as large as they can be without inconvenience in handling. I make the cakes 21½ by 27 inches. Twenty cakes of this size will complete one layer 9 feet square. The second layer has the cakes placed crosswise of the layer below, and so on to the top. This binds the whole mass together. If the bottom layer is level, and the cakes are of uniform size, with square edges, they will fit together nicely, making pounded ice between them unnecessary.

We find that it is less than a day's work for a man to saw out an abundant supply of ice for an ordinary family. During warm weather ice will unavoidably melt from the outside of the mass, and if neglected, a vacancy is soon formed between the ice and the sawdust. It is very important that the sawdust be packed down often, thus preventing the admission of warm air. When we commence marking and sawing ice, we find it an advantage to make the headings widest where we

commence to saw them. They can then be removed without binding or wedging fast.

MAKING WIRE FENCE.—A correspondent of the COUNTRY GENTLEMAN says: Having occasion the past summer to fence a pasture in Southwestern Kansas, I came to the conclusion to use the steel barbed wire, as being the best and cheapest material to allow immediate use of the pasture, in that almost treeless country. I was worried to know how to make that strong and hard wire "taut," when I hit upon the following plan. It worked admirably; without it I do not know how I could have succeeded in making a good job. I used the twisted double wire, with four barbs about 6 to 8 inches apart.

The accompanying engraving (fig. 204) will show how the machine was constructed, and also gives an idea how it was used. We loaded on two spools of wire, by running an iron bar through them, and placing them up where the roller or windlass is represented. We fasten the wires to the corner post, at the proper distance—one 3 feet 10 inches from the ground, the other 16 inches below. This makes a good cattle fence, but three wires are better. We then start up the team; the wire runs off the spools; a man lays them along the posts, and when at the next corner posts—say one hundred rods from the place of starting (more or less is no matter)—we cut the wires take off the spools; place the machine against the corner post, as shown in the cut; put the windlass in place; make a small loop on the end of the wire; put it on the hook at the end of the rope, and proceed to wind up. When the wire is "taut" we fasten it to the corner post with staples; then drive staples along in every post. We proceed in like manner with the second wire, and that line of fence is finished.

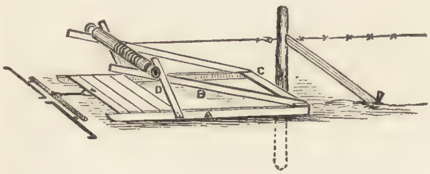

Fig. 204.—*Machine for Making Wire Fence*—A, *Runners*, 14 *feet long;* B, 2 *by* 4 *inch Braces, held in position by Standards* D; C, *Cross-piece*, 3½ *feet long*, 1 *foot wide.*

I found a little iron plate, or piece of steel bar iron, a good help in making the loops and splices in that hard, strong wire—a great saving on the hands, &c. To make it take a piece of steel bar three-quarters of an inch wide, one-eighth of an inch thick, and say 6 inches long, and drill a hole in the centre large enough to receive the wire. By putting the end of the wire through this hole, it can be bent to any required shape, without hurting the hands.

The crank used on the windlass is not shown in the cut. I set the posts 25 feet apart. At the corner I put a brace 12 feet long, to prevent the posts from being pulled up when straining the wire.

A Draining Level.—I use a simple and not expensive carpenter's level with sights, and a hole in the bottom to fit the stem of a surveyor's compass staff (fig. 205); (a set screw on the side of the staff would be almost as convenient.) With this level and a good rodman I lay off hillside ditches to prevent hilly land in cultivation from washing; drain low land; dig cellars; lay the foundation for houses, and set gate posts. It is also convenient and useful to measure the "cut and fill" in grading roads, and in short for any use on the farm requiring a level or perpendicular. I could not get along without it. The accompanying cut describes it sufficiently.—A. R. Davis, in Country Gentleman.

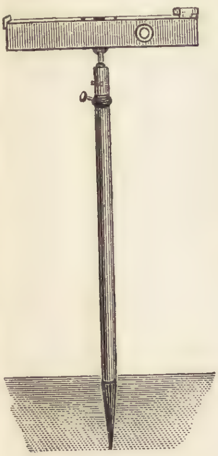

Fig. 205.—*Draining Level.*

Fig. 206.

Syphons.—On page 82 of vol. VI of Rural Affairs, a contrivance is figured and described for removing the air from the upper curve of a syphon used for obtaining a water supply, when by the gradual accumulation of air bubbles that part becomes filled with air, and the flow of the water ceases. A correspondent of the Country Gentleman describes another mode, simpler in construction, and accomplishing the same purpose. The accompanying figure (fig. 206) exhibits this contrivance, the two breaks in the pipe showing the length between the centre or high part and the two ends. A piece of pipe a foot long is soldered on at the apex of the syphon (see fig. 206.) This has an air-tight screw cap upon it. A common tap or cock is fitted to each end of the syphon. When the flow stops these cocks are shut, the cap is unscrewed, and water is poured into the vertical pipe until it overflows, and all air bubbles have escaped. The cap is screwed down again, the cocks opened, and the flow continues. A few pints of water, or less, may be sufficient to start the flow.

A Good Farm Gate.—The accompanying cut represents a gate used on the farm of George Geddes. Its leading merits are that it is made wholly of pieces of board or plank of the same width, and there are no mortices. The pieces of board of which it is made are seasoned, cut the right size, and painted, and then they may be bolted and riveted

together to form the gate, in twenty minutes. It is so firmly braced that any weight which may be placed upon it will not cause it to sag in the least.

The gate represented in the cut (fig. 207) was made of greater height and strength than would be usually necessary for common farm purposes, and was intended to form an effectual barrier against young horses. The lumber of which it is made is pine, $1\frac{1}{4}$ inches thick and 5 inches wide, painted before the pieces are put together. It is 10 feet long and 5 feet high. The two ends are vertical strips on each side of the ends of the horizontal bars, well secured with screw bolts, two being placed at each crossing or intersection. The upper space between the bars is 7 or 8 inches; the others become gradually less towards the bottom. The heel end is $6\frac{1}{2}$ feet high, but Mr. Geddes thinks the whole would be strong enough without this upward extension, and with the two ends of the same length. The hinges embrace the heel-piece, and are made by bending a thick iron strap or flat bar, without any welding, as shown in fig. 208, two screw bolts securing them firmly. The eye or socket being placed at the corner, the gate may be swung wide open. The firm bracing which this gate possesses enables it to bear any weight; if a horse in attempting to leap it should rest on it, he would not cause it to yield. Fig. 209 shows the face of the lower corner brace.

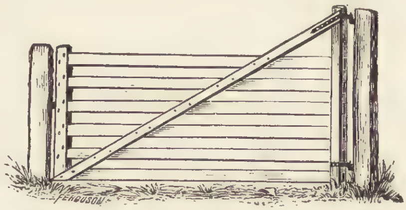

Fig. 207.

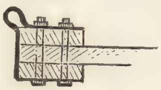

Fig. 208.

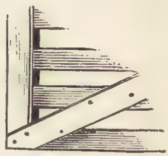

Fig. 209.

The total cost of such a gate, made of pine, bolted throughout, and thoroughly painted, would not exceed \$3. For ordinary farm purposes, where not severely exposed, a gate may be made for about half this sum, by selecting the best hemlock, using in part stout wrought nails, and oiling the rough surface with crude petroleum, instead of painting. In this case five boards, or even four, would answer, making the gate $4\frac{1}{2}$ feet high, and employing wider pieces.

The iron for the hinges is $1\frac{1}{4}$ inches wide and one-quarter of an inch thick.

Cheap Fence.—The fence shown in the cut (fig. 210) has been much employed by Geo. Geddes, as well as by other farmers. The best mode of construction and cost of making has been carefully ascertained by Mr.

Geddes. The rails which were employed in the old zig-zag fences were used, the sound ones being selected. Enough were thus obtained to build the whole of the new fence, including the vertical stakes. The fences made according to this mode have been constructed by one man, who understands the business, at the rate of eight rods in a day, digging the holes, and doing all other parts of the work. He has 20 cents per rod for the entire work, and earns $1.60 a day.

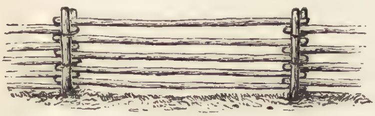

Fig. 210.

The old rails being 12 feet long, and lapping one foot at the ends, give 11 feet for each length, or three for 33 feet, or two rods. The holes are dug 3 feet deep; the workman, with his tools specially adapted to such digging, making narrow excavations at much less labor than common laborers would accomplish with spades. The two stakes are set in the hole, the earth well pounded around them, the rails placed in position, and two wire loops, as shown in the engraving, hold them firmly together. Occasionally it is necessary to insert short pieces of rails between the ends, to give full height to the fence, for which five rails will answer in common cases.

Farm Roller.—W. J. Fowler gives in the Country Gentleman the following description of a farm roller:

"The roller was in three pieces, which itself is nothing new, but the centre part was placed behind the others in a separate frame, and attached by a V-shaped smaller frame, the sharp point of which rested on the large frame containing the two forward rollers. This arrangement entirely remedies the general difficulty in using rollers, that the weight of the implement bears heavily on the horses' necks. The hind roller attached to the back of the frame balances it so that the tongue is no heavier than that of a wagon. This roller was a log about 2 feet in diameter, cut in three pieces, and each roller bound at each end with iron, and held together by a light frame (see fig. 211).

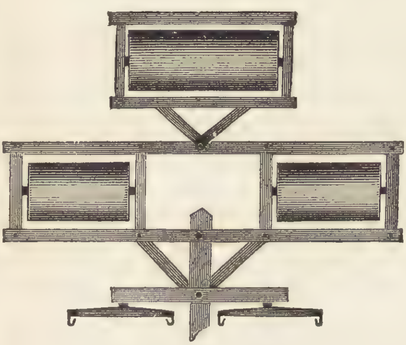

Fig. 211.—*Farm Roller.*

Each piece moves freely, and there is no plowing of the ground when turning corners of the field. The back roller may be a trifle longer than the space between the others, to insure crushing all the ground. There is no patent on this form of roller, and it can be made of logs, plank, or iron, as preferred. The one I saw was so simple that a good carpenter or blacksmith could make it."

DRAINING IRREGULAR SURFACES.—George Geddes gives the following directions in the COUNTRY GENTLEMAN:

"When the snows go off in the spring, large streams sometimes follow the valleys, and often cut deep gulleys, and drains laid along the lowest grounds are torn up. To avoid this, two drains (using smaller tiles) are effectual—each being laid a little way from the centre of the valley, and deep enough to drain it thoroughly. The two drains sometimes will cost more than the one, but not always, as the side branches are so much shortened, as is shown in the following cross-section of a field (fig. 212) having

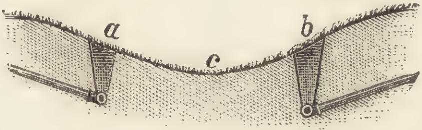

Fig. 212.

undulations and depressions running across the line of general descent. From *a* to *b* we will suppose the distance to be two or three rods, and that the surface of the ground at *c* is a foot lower than at *a* or *b*. In times of freshets, a drain at *c* would be torn up by the surface water (if the descent were sharp) that perhaps only runs for a day, while drains at *a* and *b* would be undisturbed, and when the freshet was over, carry off all surplus water."

STACKING CORN FODDER.—The fine fodder raised by sowing corn thickly in furrows or drills, cannot be dried in the field after cutting, sufficiently to prevent heating and spoiling, in stacks. We gave directions to obviate this difficulty on page 143 of vol. VI of RURAL AFFAIRS. A ventilating chimney in the centre of the stack proves of much advantage by allowing the heated air to escape, a few rails being set up together, and chained at the top till the stack is built around them. The objection to this mode is that it does not provide for the admission of air at the bottom to maintain the ascending current. This difficulty is partly obviated by building the stack on an open structure of rails and coarse brush.

A better and very perfect way, is to place the rails upright around a tree, the upper ends leaning against the lower branches. Where maples and other shade trees have been planted on farms, it often happens that just such trees are at hand. The rails are so placed that an opening is

left on each side when the stack is built, for the wind to blow through freely, as shown in the plan, fig. 213, and in the section, fig. 214. Arranged in this way, it is nearly impossible for the sown fodder to become injured by heating, if the walls of the stack are not much thicker than the length of the bundles.

But it often happens that such

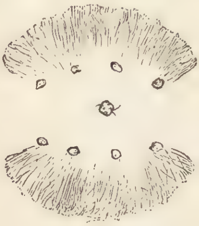

Fig. 213.

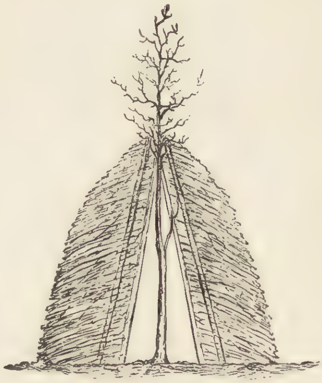

Fig. 214.

trees of the right height are not at hand, and a much improved modification is obtained by inserting two forked sticks in the ground, about ten feet up to the forks, and at a convenient distance apart, and placing a horizontal pole on them (fig. 215.) The length of this pole will determine their distance asunder. Then set a number of rails nearly upright or slightly leaning, with the upper ends against the horizontal pole. Against these vertical rails the oblong stack is built, open at the ends, through which the wind freely blows. A series of forks will admit of the stack being made as long as may be desired for any amount of fodder.

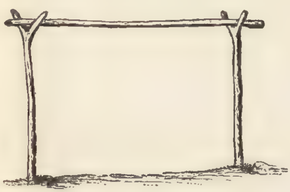

Fig. 215.

Pumping Water Up Hill.—A correspondent of the Country Gentleman describes the following contrivance in answer to an inquiry for the best mode of obtaining water from a spring 225 feet distant from the house and 15 feet lower: "A lead pipe of 1¼-inch bore should be laid under ground below the reach of frost (perhaps 2 feet deep), from the spring to the house. A well 16 feet deep should be dug where he wants the pump. The pipe should be carried to the bottom of the well, turned and brought up into connection with the pump upon the surface of the ground. (See fig. 216.) A pump of the best construction should be used. Blunt's Universal pump would be the best, as it is the most perfect one I know of, and will pump air as well as water. With this arrangement there will

be the advantage of a syphon; the pipe will always be charged with water; the 15 feet elevation may be reduced to 11 feet by digging the ditch for the pipe 4 feet deep at the upper end, and the water may be always brought up from the spring by the use of the pump mentioned. By using the non-freezing pump, made especially for the purpose, and which is a force as

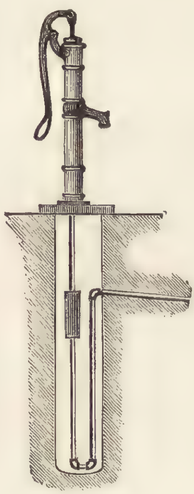

Fig. 216.

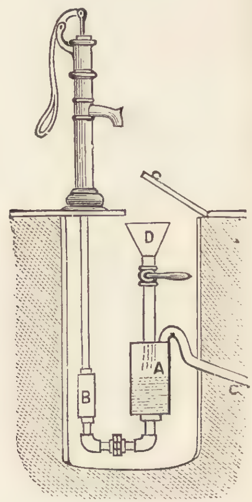

Fig. 217.

well as a suction pump, water may be drawn in winter without trouble from frost, and many uses may be made of it for the barn and house."

A check valve should be placed at the foot of the pipe to keep it always full. A small hole drilled in the pump tube 3 feet below the ground and above the lift, will let out the water down to that hole, and there will never be any danger from frost. The writer states that he used this mode a few years ago with perfect success.

Another mode is described in the same journal by H. L. Emery, and although more expensive and complex, possesses some advantages. It is shown in the annexed cut, (fig. 217,) an excavation of moderate depth being sufficient. The air-chamber and reservoir *A* is made of strong, riveted and galvanized iron, about one-sixth of an inch thick, and with convex heads, to withstand pressure. It is first filled with water through the funnel *D*, and the stop-cock at *D* is then permanently closed. The pump at *B* is set in motion, and takes the water from *A* at each stroke, and leaves a partial vacuum. In this case the water is to be elevated in the long pipe 15 feet, requiring a half vacuum. Therefore when *A* is

over half empty, the water is drawn up through the long pipe from the spring. A continuous flow is thus effected, the chamber *A* proving a regulator, and the flow is smooth and easy. The chamber should be large enough to hold as much water as the long pipe, which is easily determined by calculation. The long pipe should be at least an inch in bore—better and with less friction if an inch and a quarter.

Drawing off Corn.—It sometimes becomes desirable to draw off corn as soon as it is cut, before husking. We have adopted a contrivance for this work, which we find quite convenient, and with which we do the work rapidly. It has the advantage of a low sled, without its hard draught or friction. The contrivance is shown in its general construction in fig. 218. It consists of a long and broad frame, suspended by chains under

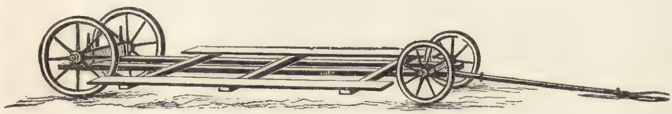

Fig. 218.

the axles of a common farm wagon. In order to give sufficient length for a long load near the ground, a reach 20 feet long is used, throwing the forward and rear axles 18 feet apart. We used a locust pole, cut from a thick grove where the trees were tall and slender. It curved downwards nearly a foot, so as to bring the platform near the ground. Just within the rear and forward wheels and closely under the axles, two stiff pieces of timber, one on each side, were chained to the axles. These timbers were over 20 feet long, 4 by 6 inches, and sound, clear hemlock. Cross-pieces 7 feet long were spiked to these long timbers, extending outward beyond the wheels, on which were nailed 2-inch boards, for an outer railing. The frame or platform was thus 7 feet wide, over 14 feet between wheels, and a little more than a foot above the ground; and it was thus ready for service. The materials did not cost $2, and two men rigged it in an hour or two. Fig. 219 is a cross section, and shows the details more accurately.

Fig. 219.

Small sized shocks of cut corn were placed rapidly on this low frame and drawn off the field to the place where they were to remain. It was found most convenient to place the shocks in double rows in their new locality, like the double-row wheat shocks made of the sheaves in the field.

If the shocks are large, it is inconvenient to handle them; if rather small, two men with a rope will place them on the load with ease. We

found no difficulty in loading a full ton of the corn on the long frame without making a high load.

In some instances it will be found easiest to place the stalks on the load while cutting, and to draw them off as fast as the load is made.

There are three advantages in being thus enabled to draw the corn from the field. Many farmers do their husking under shelter, in rainy or stormy weather, and this enables them to secure an easy supply. Some have their cornfields in exposed places, remote from the dwelling, where the corn is liable to be pilfered. One farmer, near a large village, last year estimated that he lost in this way fifty bushels from a few acres. A third advantage is in clearing the ground for sowing wheat, which has succeeded well where early corn has been planted, and the soil is rich natural ly or with previous manuring. Some heavy wheat crops have been obtained in this way, although the practice has not been generally adopted in grain regions, on account of the labor of moving the corn in time, and because early ripening sorts have not been planted.

PROPORTION OF GRAIN TO STRAW.—E. W. Stewart, writes as follows in the COUNTRY GENTLEMAN: "The question has no doubt often arisen as to the relative weight of grain and straw in a wheat, oat or other grain crop—that is, in a ton of grain in the straw, as it comes from the field, what proportion is grain and what proportion is straw? This has been determined frequently in England, but seldom in this country. In 1876, from 27,760 pounds of spring wheat in the straw, as it came from the field, after sweating and curing in the mow, we threshed out 157 bushels, or 9,420 pounds of wheat. This is one of grain to 1.94 of straw, or 33.9 per cent. of grain to 66.1 per cent. of straw. The same year, from 30,200 pounds of oats in the straw, after remaining two months in the mow, we threshed out 12,678 pounds of grain, or one of grain to 1.36 of straw. This is equal to 42 per cent. of grain to 58 per cent. of straw—a very large proportion of grain.

"In 1877, I put in barn 26,469 pounds of spring wheat in the straw, and after lying in mow two months, threshed out 9,198 pounds of grain, which is one of grain to 1.87 of straw, 34.7 per cent. of grain to 65.3 per cent. of straw. I also put in mow 60,000 pounds of oats in the straw, and threshed out 802 bushels, or 25,664 pounds, being one of grain to 1.34 of straw, which is 43 per cent. of grain to 57 of straw. The average of the two years was—spring wheat, one of grain to 1.90 of straw; oats, one of grain to 1.35 of straw. In the latter year from 12,995 pounds of peas and oats raised together in the straw, we threshed 4,000 pounds of grain, or one of grain to 2.22 of straw. This is a larger yield of grain in wheat and oats, than is generally reported in England. It is generally calculated in wheat, one of grain to two of straw; and in oats, one of grain to 1¼ of straw. My oats this year had a large proportion of long straw, and I was surprised to find so large a proportion of grain, but the oats weighed 35 pounds to the bushel measure. I find this weighing very convenient, as

it enables me to know within a few bushels how much grain I have. With scales convenient, it costs nothing to weigh, and the knowledge serves an important purpose."

ITEMS IN DOMESTIC ECONOMY.

THERE ARE MANY SMALL CONTRIVANCES that would save petty annoyances if generally understood, among which the following are worthy of brief notice and description:

MEDICINE IN A SPOON.—In dropping out of a vial simple remedies, the operator commonly holds the spoon in one hand and drops with the other, often spilling a portion of the contents in the attempt to insert the cork, or to add water. To obviate the help of a second person, thrust the handle of the teaspoon between the leaves of a book, and it will be held securely without trouble, as shown in fig. 220.

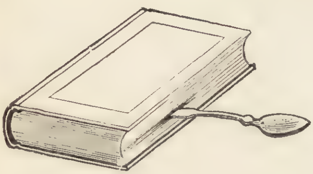

Fig. 220.—*Convenient Spoon-Holder.*

USING A MICROSCOPE.—A common hand microscope may be used to advantage in looking for or removing a thistle or splinter from the hand, but the operator wants a third hand while holding the glass with one and looking at the other. Adopt the same course as for the spoon, and both hands are free.

KEY OR COIN IN A LETTER.—A common way of enclosing a coin, key, check, &c., in a letter, is to put it in loose, leaving it to slide about, and sometimes to be lost out. The right way is to fold it in a piece of paper, and then to fold the paper around it, leaving a broad, flat wing, so that the coin cannot slide or rattle. If this paper wing is about the size of the inside of the letter, it will remain very secure, as shown in fig.221. The dotted circle shows the coin.

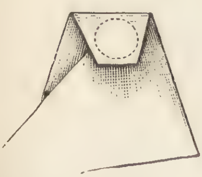

Fig. 222.—*Coin in a Letter.*

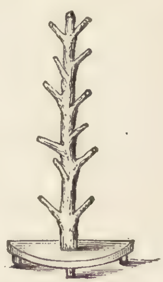

Fig. 222.—*Hat Stand.*

PINS FOR HANGING.—A good hat or coat stand may be made by selecting a tree with regular limbs (a spruce or cedar tree is usually best); cut off the limbs (fig. 222) so as to leave stumps six inches

long, shave off the bark, dress the whole neatly, varnish it, and affix it to a plank base. Coats and hats may be hung on this stand more conveniently than on most of the costly supports sold for this purpose. The same kind of support may be used on a larger scale in carriage houses for hanging harness, bags, &c., and the large posts in barn basements, if made thus of the trunks of trees with the limbs sawed so as to leave projections, would be found convenient for many purposes.

Postal Cards.—Where several of these are used, they are apt to adhere slightly together, and two are picked up for one, and mistakes made in this way. To prevent such mistakes, bend them slightly, or bend one corner, and they cannot lie closely together.

How to Hang a Thermometer.—Thermometers are commonly hung on a nail for determining the temperature of a room or church. Persons brushing hastily past often throw them off the nail and break them. Or, if thus hung out doors, the wind sometimes blows them off. To prevent all accidents of this kind, at no cost, and with half a minute's work, drive two nails instead of one, just far enough apart to allow the wire loop of the thermometer to pass between them—fig. 223.

To Level a Clock.—When a clock is not adjusted to a perfect level, it ticks unequally, runs with less accuracy, and is more liable to stop. A quick ear will detect the unequal strokes of the pendulum, and will adjust the level with considerable accuracy; but an easier and more perfect way is to *measure* the distance of each ticking point from the centre. Suppose for example that the pendulum when at rest is represented as in fig. 224, and that when slowly moved by the hand it ticks at *a*. Make a mark at this point, and then slowly move the pendulum till it ticks again on the opposite side at *b*. These two points, it will be seen, are at unequal distances from the pendulum. Then wedge up one side of the clock until the pendulum hangs exactly midway between them, as in fig. 225, by careful measurement. The ticking will then be equal.


Fig. 223.—*Hanging a Thermometer.*

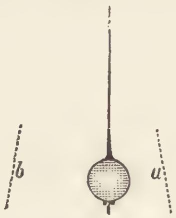

Fig. 224.—*Misadjusted Clock.*

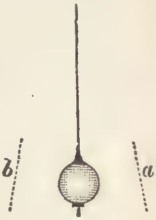

Fig. 225.—*Adjusting a Clock.*

Weighing Letters.—The small balances used in kitchens may be used for determining the weight of letters and small packages to be sent

by mail, by reckoning 60 cents in silver as half an ounce, the weight of one letter of 3 cents postage. If the letter balances half a dollar of U. S. currency, it will be safely within weight. If the letter weighs only a quarter of a dollar, a 25 cent coin may be enclosed and still be light enough to pass with single postage. And at the same rate for larger packages.

OILING LATCHES.—Passing through the different rooms of the house once a week (say every Saturday evening, or other regular stated time,) and touching the latches, locks and hinges of the doors with a drop of kerosene or a little tallow from the candle, will keep them well lubricated, and the doors will always shut smoothly and quietly, instead of jarring, grating or creaking, and the doors and latches will both last the longer for this regular attention.

REMOVING BOX COVERS.—Those who receive seeds, fruits, plants and various objects of merchandise in boxes, often split and destroy the covers in taking them off, when they might as well be preserved entire for the next time the box is used. Procure two hard-wood wedges a few inches long, and half an inch or an inch square, and set one of these in the crack between the lid and box, near a nail, and drive it in with a hammer. It will raise the lid slightly, when the other is inserted and treated in the same way. In this way the cover is taken off entire without harm to the box or its contents.

A CONVENIENT WASH-TUB.—L. D. Snook gives in the COUNTRY GENTLEMAN the following description: "The sides are 5 feet in length and 15 inches high; the bottom is also 15 inches wide. The top of the box should be 18 or 20 inches wide. It should be made from $1\frac{1}{4}$-inch well seasoned pine stuff, and put together with white lead in the joints, and held in position by a liberal use of $2\frac{1}{2}$-inch wood screws. A carpenter will put it together in less than half a day.

"The section *A* (fig. 226) is used for washing the clothes, while *E* is used for rinsing, or bluing, as the case may be. If a wringer is used, at-

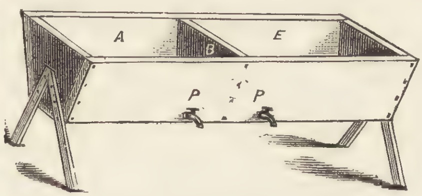

Fig. 226.—*Convenient Wash-Tub.*

tach it to the partition *B*, or at the end as the progress of the washing demands. Insert faucets at *P P*. The wash-room may be so arranged as to convey the suds, &c., directly into an outlet pipe or drain, which will save much lifting. Make its legs of any length desired. Handles may

also be attached at each end for more easy handling. This arrangement is cheaper than ordinary wash-tubs, and will be found far more convenient."

HOARSENESS IN SPEAKERS OR SINGERS.—A few drops of nitric acid in a glass of sweetened water, taken twice daily.

BLISTERS FROM BURNS.—The pain is quickly relieved by immersion in a saturated solution of salt.

TO PREVENT A FELON.—When a felon is threatened on the finger, by approaching inflammation and a sensation like a sharp thorn inside, apply immediately *tincture of iodine* until a blister is produced, say every half hour more or less, and repeat the blistering as often as required. If taken in time, this remedy will mostly avert the disease. The same application, less frequently, will cure many of the small sores or small external annoyances on the hands or elsewhere.

CANKER SORE MOUTH is most easily cured by touching it once a day with a small crystal of blue vitriol, commonly called blue stone.

NOTES ABOUT FRUIT AND FRUIT CULTURE.

NUTRIMENT IN FRUIT.—R. F. Kedzie of Lansing, Mich., has published, in the Pomological Report of that State, the analyses of different kinds of fruits, to show the amount of nutriment they contain as compared with common articles of food. Among other results reached in this examination are that an egg weighing 794 grains (over an ounce and a half) is equivalent in nutritive power to 17 ounces of heart cherries, 22 ounces of grapes, 30 ounces of strawberries, 40 ounces of apples, and 64 ounces of pears. These figures show the comparative value of the different kinds of fruits for food, as shown simply by analysis, heart cherries containing the largest amount of nutriment and pears the least. But fruits possess a higher real value than is shown by analysis. Well ripened, and in moderate quantities, they are more easily digested than many of the richer foods, a part of which may be lost. But they assist in promoting the healthy action of the digestive system, and in this way perform a most valuable service. It is well known that the inhabitants of newly settled regions are far less liable to become attacked with diseases resulting from malaria, if allowed to partake of regular supplies of well ripened fruit, even if in a dried state. Among the common foods containing the largest proportion of nutriment are eggs, fresh meat, such as beef, pork, veal, fish and mutton, bread made of wheat flour and Indian meal, and rice. These contain about three to five times the amount in potatoes, and more than ten times as much as in carrots, parsneps and turnips. The three last named substances contain nearly the same as the richest fruits, as indicated by analysis.

HEALTH PROMOTED BY FRUIT.—We have given on several former occasions some striking facts showing that prevalent diseases are in a great measure prevented by a regular and moderate supply of well ripened fruit, especially in newly settled countries. We observe in some of the agricultural papers the statement of Dr. B. F. Dunkley, of his experience since he first went to Missouri, thirty years ago. Orchards were few at that time. Diseases of the bowels, lungs, &c., prevailed, and were often fatal. Malignant dysentery afflicted many families. In the absence of other fruit, Dr. D. told many of his patients, to their surprise, that they needed no medicine other than oranges and lemons. Now that fruit and vegetables are abundant, diseases are fewer, less malignant, and yield more readily to treatment. When orchards began to bear, it was observed that children who ate regularly and plentifully of the fruit had excellent health, while mortality prevailed when there was none.

FRUIT AS MEDICINE.—A paper written by P. Holloway was read at a meeting of the Lucas County (O.) Horticultural Society, in which he spoke strongly in favor of the beneficial effects on the health of eating blackberries. He had cured himself of dyspepsia by living upon a small quantity of bread and butter, accompanied by strawberries, raspberries, blackberries and peaches, in their respective seasons. The president thought blackberries the most wholesome of all fruits.

THE FRUIT CROP.—Ex-Governor Furnas of Nebraska stated at a recent horticultural meeting that the fruit crop of this country in 1877, was estimated at $143,000,000. If shippers to foreign markets will build up a reputation for supplying only the best in quality, the value of the crop will undoubtedly greatly increase.

SELECTION FOR A FRUIT GARDEN.—The occupant of a new place wishes a selection, or moderate list of varieties of the large and small fruits for spring planting. In giving a list for this purpose, every cultivator would vary more or less in naming different sorts, according to personal preference founded on diverse tastes, varying success with soil, and with cultivation and keeping; but there are a few sorts which are widely approved, to which additions may be made to suit different regions of the country, this list being intended for the northern and more eastern States.

It may assist those who have partial plantings, in completing their collections. The earliest sorts are named first, so that with apples the first will be summer varieties, then autumnal, followed by winter sorts, and ending with long keepers. With pears the season will be shorter, or from mid-summer to mid-winter, while peaches and plums will extend only eight or nine weeks.

Apples.—Early Harvest, Red Astrachan, Sweet Bough, Autumn Strawberry, Porter, Gravenstein, Maiden's Blush, Fall Orange, Twenty Ounce, Westfield Seek-no-further, Baldwin, Rhode-Island Greening, Northern Spy, Roxbury Russet. Some will add Early Strawberry, Fameuse, and Golden Russet of Western New-York.

Pears.—Summer Doyenne, Giffard, Rostiezer, Tyson, Washington, Bartlett, Boussock, Seckel, Howell, Sheldon, Duchesse, Anjou, Winter Nelis, Lawrence and Josephine de Malines.

Peaches.—Amsden, Early Louise, Hale, Serrate Early York, Large Early York, Crawford's Early, Crawford's Late and Oldmixon Free.

Plums.—Rivers' Early Favorite, Lawrence Gage, Prince's Yellow Gage, Lombard, Bradshaw, Imperial Gage, McLaughlin, Reine Claude de Bavay and Coe's Golden Drop.

Cherries.—Early Purple Guigne, Governor Wood, Black Tartarian, Coe's Transparent, Early Richmond, Reine Hortense, Rockport, Large Morello. [*Note.*—We place Early Richmond after some other sorts which it is supposed to precede, but its full size and flavor are not reached unless it hangs long on the tree.]

Grapes.—Hartford, Delaware, Wilder, Concord, Diana.

Raspberries.—Doolittle, Mammoth Cluster, Philadelphia, Herstine, Franconia.

Strawberries. — Wilson, Cumberland Triumph, Charles Downing, Triomphe de Gand, Sharpless, Kentucky.

As already remarked, no two cultivators will make the same list, and no one cultivator will make the same list in different years; and some would criticise sharply their own previous selections, if they did not know who made them. The preceding, however, would afford a rich family supply, if growing on good soil and with good management and cultivation.

STRIPPING LEAVES FROM PLANTS.—The injury or check to the growth of plants by stripping off the leaves in summer is generally well understood, but corroborative cases are often interesting. An instance is reported in the Farmers' Gazette, as quoted in the Virginia Agricultural Report, where the leaves were all left on a row of corn, and the weight of the crop was 161 pounds, while on a stripped row it was only 88 pounds. In some other cases the difference was less, but distinct and striking in all. The same principle applies to pruning fruit trees in summer, which should be omitted or sparingly performed except where the trees are sufficiently vigorous to bear some check.

CULTIVATING ORCHARDS.—The oldest apple trees which we know of which continue bearing good crops, are those which stand in the corners of gardens, where they are yearly subjected to rich cultivation through the attention given to garden crops. A correspondent of the Practical Farmer furnishes an example of similar treatment and like results. An orchard was set out in 1816, or sixty-three years ago. Thirty-five trees remain, and they have yielded over $137 worth of fruit in a season. They are moderately pruned every alternate year. Two crops are taken from the ground every five years, and the land is then seeded. The plowing is done in two directions, running as closely to the trees as practicable. All other orchards in that neighborhood planted at the same time, and

allowed to stand in stiff sod, have disappeared. Another writer in the same paper says he kept his young orchard well cultivated with hoed crops for several years. They grew 18 inches to 2 feet in a season. Only one tree died. A neighbor set out an orchard at the same time, and seeded it to grass. In three years one-third of the trees were dead, and those which lived grew only from 2 to 6 inches in a year. This is about the usual experience.

Prof. Beal of Lansing, Mich., says: "If you have money to fool away, seed down your young orchard to clover and timothy, or sow a crop of wheat or oats. If you want the trees to thrive, cultivate well till they are 7 to 10 years old. Spread ashes, manure, or salt broadcast. Stop cultivating in August, weeds or no weeds. This allows the trees to ripen for winter." He adds that the question whether to cultivate old orchards or not, must be answered by manuring the trees. If the color of the leaves is good, and they grow well and bear fine fruit, they are doing well enough, even if in grass. But if the leaves are pale, the annual growth less than a foot on 12-year trees, and the fruit small and poor, something is the matter, and they are suffering for a want of cultivation or manure, or both. Prof. B. says that "to judge of the condition of an apple tree is like judging of the condition of sheep in a pasture. Look at the sheep and not at the pasture, and if they are plump and fat, they are all right."

Trees in Grass.—A correspondent of the Gardener's Monthly, living in New-Hampshire, furnishes an example of a successful orchard, with trees standing in grass. The land was never plowed, the ground being unusually rocky. The trees, however, have been regularly and liberally manured. The writer seems to have overlooked the fact that it is the manure and not the grass that makes the trees bear and grow so well. We have heard of the farmer who found sawdust pudding an excellent feed for his cows; all that was necessary was to add liberally of Indian meal—and, in fact, the larger the proportion of Indian meal, the more satisfactory was the effect of the sawdust. We are reminded of this anecdote by much that is said in favor of grass in young orchards.

Draining Orchards.—Prof. Ingersoll mentions a successful experiment performed on the college grounds, which shows the importance of draining where trees suffer from a wet subsoil. The trees had become nearly stationary in growth, and yielded little fruit. The orchard was drained by putting a 2-inch tile between the rows, at a depth of 3 or 4 feet. The trouble was entirely remedied. "The trees sprang into luxuriant growth," says Prof. I., "and fruited well. They have done more in two years since draining than in five before."

Some objection was made by a member to draining orchards, on account of the liability of the roots of the trees filling the tiles. The roots of an apple tree near the drain had entirely filled the aperture and stopped the current. Prof. Ingersoll said that experience indicated that the drains could be depended on to remain unobstructed for 15 years, when

the orchardist could afford to clean them out. Mr. Moody said he had a cheap remedy, in cementing the joints with hydraulic cement when laying down the tile. The water still finds its way freely through the porous tiles. He had found that a tile plugged at both ends would fill with water in one minute. Prof. Ingersoll related a conversation he had with an orchardist, who had drains 15 years among his trees before they were stopped by roots. When asked if he intended to take them up and replace them, he answered: "Certainly, sir. I would not be without them for half the value of the orchard." The selection of ground with a good natural drainage was suggested by others.

ENRICHING ORCHARDS.—J. C. Plumb of Milton, Wis., a veteran fruit cultivator, urges the importance of good soil and good cultivation in young orchards. The whole surface should be kept mellow with some hoed crop early in the season, with little or no culture late in summer and in autumn, to favor the ripening of the wood for the cold winters of that region. When in full bearing, the orchard may be seeded to clover, and each successive crop turned under every two years, with a light dressing of manure in the alternate years when not plowed. Buckwheat does well, if left to decay on the ground. One plowing the following May, and harrowing, will give a self-seeding.

GREEN CROPS FOR ORCHARDS.—T. G. Yeomans of Walworth, N. Y., enriches the land of his extensive and successful orchards, by sowing rye in the fall, and when in full green head, plowing under, following with sowed corn, to be plowed under late in the season.

THINNING FRUIT.—An orchardist who makes his trees bear a moderate crop every year, of larger and finer fruit than when crowded, gives the following directions for doing the work: A light ladder is used to give ready access to any part of the tree. The branch is held in the left hand, while with sheep-shears in the right, every bunch of apples is cut off, leaving a part of the stem of each fruit. This is done as soon as the blossoms have fallen, and before the young fruit has attained any size. When this branch is entirely cleaned, the next branch is skipped, and the third cleared of the fruit like the first, and so on until every alternate branch is divested of its fruit. This work is not done on the small limbs here and there over the tree, but on main branches, and equally on both sides of the tree. Of medium sized trees, an active man will go over fifteen or twenty in a day.

CEMENT FOR PRUNING.—Dr. T. H. Hoskins of Vermont, who has had much experience in orchard management, finds the following composition for a cement to encase wounds made by pruning, the best he is acquainted with: One quart fine North Carolina or pine tar is to be boiled slowly for three or four hours. Add to the boiling tar four ounces of tallow and one pound of beeswax, and stir all till well mixed. Remove the vessel from the fire, and stir the contents till partly cooled. As soon as the cement begins to thicken, stir in a pound of powdered and sifted clay,

previously prepared. Stir till nearly cold, to prevent the clay settling. In summer, this cement is just soft enough to be easily spread with the point of a knife. It excludes moisture, and does not harden or crack. The boiling of the tar is necessary to drive out the turpentine. This application is similar to, but better than the simpler mixture of pine tar and brick dust, which we employed many years ago for the same purpose.

Liquid Grafting-Wax.—This, if properly made, may be readily applied to out-door grafting, without the trouble of heating, and it is also a good application to wounds made in pruning. The following directions are given by W. W. Tracey: Melt a pound of resin with a pound of tallow, and when mixed, remove from the stove and allow it to cool till a scum begins to form. Then add a teaspoonful of turpentine. Replace on the stove, and add seven ounces of a mixture of two parts of alcohol and one part of water, stirring briskly, and taking care that the alcohol does not burn, as it will if too hot. Stir till of the consistence of honey; keep corked, and apply with a brush. If it gets too hard, re-melt and apply a few drops of turpentine, and of alcohol and water. It hardens after applying.

Trimming the Roots of Seedlings.—Peter M. Gideon of Minnesota remarks that in the early days of his horticultural experience, he was "crazy" to secure all the little fibres, even on his seedlings used in root-grafting. He has now got over all this, and he finds the cleaner the seedling roots are of fibres, the better they will grow, by sending out new tender rootlets. With orchard trees he wants all the roots he can get, but it is not at all essential to secure the growing points.

Rabbits and Mice.—A western paper says that common straw paper tied around the trunks of trees, and painted with tar, or with lime wash mixed with a decoction of tobacco, is the safest and easiest repellant of rabbits and mice. Fresh blood will repel rabbits, but is very attractive to mice.

Profitable Orchards.—J. W. Gray of Orleans County, N. Y., reported at a horticultural meeting at Rochester, about a 14 acre orchard at Albion, 8 acres of which were 50 years old, and 6 acres 30 years old, the apples from which sold in 1867 for $3,000, and in 1869 for $2,000. For several years before, it averaged $1,600 a year. In 1878 it bore 940 barrels. The sorts are chiefly Baldwin, Greening, Spitzenburgh, Roxbury Russet and Tompkins King. The land is plowed and cropped alternate years, and a load of manure applied every third year to each six trees. Mr. Gray's own orchard of 12 acres, on soil with natural drainage, is plowed shallow very early each spring before the buds swell, harrowed occasionally till July, and sheep and hogs kept in through the season. He had in 1878 400 barrels of choice fruit scarcely affected with the codling moth.

Oil on Young Trees.—The editor of the Gardener's Monthly gives

the successful result of the use of linseed oil in destroying the scale on his apple and pear trees, which were badly infested with it. Other cases are reported to him where oil killed the young trees. He inquires why the results should be so different. Doubtless if the time of year when the application was made, and the condition of the bark, were stated in these several instances, the case would be a plain once. Oil applied while the trees are dormant will generally become dry, hard and harmless before the leaves expand and growth commences, and no harm will be done. Or, applied to the rough exterior of trees several years old, it will not penetrate to the green bark. It appears to be particularly fatal to young peach trees.

The same paper gives a statement from G. R. Dyckman of Shippensburgh, Pa., of his experiments in applying oil to the trunks of fruit trees —a practice which has been strongly recommended by some for its beneficial effects, and among others as a protection against pear blight. Mr. D. applied oil to 600 peach trees, 200 apple, several pear and plum trees, and 100 quince. All the peach trees, five years planted, were killed; the other trees were not injured. Other peach trees were painted with refuse lard and linseed oil, and these are all dead. The object in greasing was to keep the rabbits off. Oil is sometimes applied for the white scale, and these experiments show the necessity of discrimination and caution, and the importance of trying doubtful experiments to a moderate extent.

Apples for Pennsylvania.—The Secretary of the Pennsylvania Board of Agriculture received a large number of responses to his questions to fruit-growers in that State, asking each for the names of the three best or most popular or profitable apples. The result was that the Early Harvest, Red Astrachan and Sweet Bough had the highest vote for summer sorts; Maiden's Blush, Rambo, Smokehouse, Queen and Fallawater, the highest for autumn; and Baldwin, Rhode-Island Greening, Northern Spy, Smith's Cider, Roxbury Russet, Tompkins King and Seek-no-further for winter.

For Wisconsin—The Wisconsin Horticultural Society gives the following lists of apples for that State: For extreme hardiness only—Tetofsky, Duchess of Oldenburgh, Haas, Plumb's Cider and Fameuse. For general cultivation—Tetofsky, Duchess of Oldenburgh, Haas, Plumb's Cider, Fameuse, Walbridge, Red Astrachan, Utter, Westfield Seek-no-further, Ben Davis, Tallman Sweet, St. Lawrence, Willow Twig and Pewaukee.

For Minnesota.—Most of our readers are doubtless aware that the fruits regarded as quite hardy in most of the Northern States, cannot endure the winters of Minnesota. A special list must therefore be made for that State, and we have occasionally given the names of such fruits as succeed there. The following list is furnished by J. H. Harris, an experienced orchardist of that State: Duchess of Oldenburgh, Tetofsky, Plumb's Cider, and Fall Queen or Haas. Red Astrachan and Fameuse

are not hardy enough. Late Strawberry will scarcely answer. Ben Davis, Gravenstein, Rambo, Fall Pippin, and Maiden's Blush, although hardy in some cold localities, fail in Minnesota.

For Iowa.—The Iowa Horticultural Society has adopted the following list of apples for general cultivation in that State: For Summer—Tetofsky, Oldenburgh, Red Astrachan, Benoni, and Early Joe, top worked. Autumn—Maiden's Blush, Chenango Strawberry, Bailey's Sweet, Dyer, Gros Pomier, Fameuse, Fall Orange, Lowell, Porter, Utter's Red, Wealthy. Winter—Jonathan, Tallman Sweet, Rawle's Janet, Iowa Blush, Ben Davis, Willow, Walbridge, Lansingburgh.

For Missouri.—Missouri orchardists recommend Ben Davis as the best for profit, and Smith's Cider next. Rome Beauty is strongly commended. The Lawver promises well in that State, but is too small and poor in New-York. Rawle's Janet and Winesap are good apples in Missouri. Smith's Cider has been found to pay well in Pennsylvania, where one man at New-Hope received $2,000 from his crop of this sort.

Assorting Apples.—H. E. Hooker of Rochester stated recently, at a meeting of the Western New-York Farmers' Club, that his method is to gather his apples the first of October, and the pickers bring them in the baskets and empty them carefully on a long table, where they are conveniently assorted and put into barrels. These are placed in a cool place, north of a barn, and removed to a cold cellar as the weather reaches freezing. For marketing, careful and uniform assorting is essential.

Hardy Fruits for Iowa.—The Prairie Farmer gives the following selection of hardy fruits for Central and Northern Iowa, made by Prof. Budd of the agricultural college of that State. For summer apples he names Tetofsky, Oldenburgh and Saxton; for autumn, Plumb's Cider and Fameuse; for winter, Wealthy, Walbridge and Iowa Russet. The only cherry tree that proves satisfactory is the large English Morello, planted deep enough to throw out its own roots, which is much better than to stand on the more tender mahaleb and mazzard stocks.

Raising Seedling Peach Trees.—It is well known that certain varieties of the peach, especially the yellow-fleshed sorts, vary but slightly from the parent peach when raised from the stone. Others vary more; but in doing so, occasionally give valuable fruits. The Amsden and Alexander, raised from the Hale, are examples. It is worth the trial for those who have the ground to spare, to devote some space to seedlings, and they can hardly fail to obtain some good fruit. About fifty years ago, David Thomas procured a quantity of peach stones from an orchard planted with several of the best sorts. These were planted in a row about 50 yards long, and a foot apart. They grew and bore. Several proved rather poor in quality; many were good enough for use on the table, and a few were really excellent. Among the latter was the White

Imperial, which originated in this row of seedlings. A more general practice of raising seedling peaches would doubtless result in a great improvement in our list of varieties.

Endurance of Peach Buds.—It is well known that under ordinary circumstances the fruit-buds of the peach will mostly perish with a temperature of 12° below zero. Under favorable conditions they will survive a more intense cold. One of the most important of these conditions is produced by continuous cool weather previously, preventing the swelling of the buds. Another is the very brief continuance of the cold; and a third is shielding them, after the cold snap, from the morning sun. With these conditions a portion of them frequently escape a temperature of 16° or 17° below. At a meeting of the Lucas County (Ohio) Horticultural Society, Mr. Hefflebower said that only the more tender varieties had been killed in the winter, although the mercury fell to 19° below zero. The reasons given were the excellent ripening of the wood in autumn, and the absence of previous sudden changes of the weather.

Peaches in Georgia.—The peach appears to be the great leading fruit in Georgia for market. P. J. Berckmans says that immense quantities have been shipped to northern markets, with generally very satisfactory results. At a meeting of the State Horticultural Society, many collections contained from 40 to 60 varieties, ripe and in good condition. The society recommends the following sorts: Alexander, Amsden, Beatrice, Hale's Early, Fleita's St. John, Tillotson, Mountain Rose, Chinese Cling, Early Crawford, Gen. Taylor and Duff Yellow. The last two are large and highly colored early clingstones.

Crowding Vineyards.—In proof of the well-known fact that strong growing sorts are injured when not allowed ample space, Mr. Winchester of St. Joseph, stated that a single vine extending 50 feet on a trellis yields more grapes than the same length of trellis, covered with vines planted 8 feet apart. In the report from Ingham County, W. A. Rowe says the best vineyard he ever saw was planted 8 by 12 feet, and every alternate plant was to be taken out in three or four years.

Covering Grapevines.—There are three modes employed in covering vines for winter. One, which must be performed before the ground freezes, is to lay them down, and place on them 2 or 3 inches of soil. This does well if the soil is not too clayey, the winter not wet, and the vines well ripened. Otherwise there is danger of rotting, and merely laying them on the ground may be safer, as they will be more or less covered with snow, and be less exposed to the wind than if left on the trellis. If this does not afford sufficient protection, a perfectly safe covering is made of the branches of evergreen trees. To hold the vines down we find nothing so convenient as sticks of stove wood. Vines are more or less benefited every winter by laying down, as a very hard freezing more or less affects their vitality and lessens their vigor in early spring.

Keeping Grapes.—Every year we have some new process presented

to us for keeping grapes fresh in winter, each being a variation of the old way. It is well for those who are packing their grapes for winter, to keep in mind the essentials for success, and to vary the non-essentials according to circumstances. Standing first as indispensable, the fruit should be well-grown and well ripened. Matured rich juice will keep the bunches far better than if green and watery. But this is much better understood now than in former years, and better cultivation is now generally given. The next requisite, and also indispensable, is to place the fruit in a cool, dry room. If it is well matured, it will not freeze at several degrees below 32° Fah. It will not endure long in a warm temperature. These are the two great essentials. The materials in which the grapes are packed are of secondary importance. Baked sawdust is excellent, because being a non-conductor of heat, it preserves a uniform temperature; and absorbing moisture, it keeps the fruit dry. Soft straw, chopped an inch long, is a good material to pack in, and is more easily freed from the berries. Dry maple leaves answer a good purpose. Cotton batting does well, if previously well dried. A damp room should be avoided, as it would cause mould. Waxing the ends of the stems amounts to little, as the moisture is absorbed or given off all along the sides.

The following mode, described by E. F. Guild of Saginaw, Mich., will be new to most of our readers: The grapes are picked on a dry day, and placed in stone jars, in alternate layers with soft paper or any other absorbent to keep the fruit dry. Dig a trench in a dry spot, 8 inches deeper than the tops of the crocks when set in, and cover them loosely with a board till the ground begins to freeze. When it has frozen the earth to the depth of 4 or 5 inches, put on mulch or coarse manure to keep out frost. The jars are easily taken up one at a time through the winter. Mr. G. says if they were buried deep in the earth, they will keep till grapes come again, but he does not say he has tried it.

Fruits for Kansas.—At a recent meeting of the Kansas State Horticultural Society, the following fruits were generally reported as doing well: Early Richmond cherry, Wild Goose plum, Blackcap raspberries, Kittatinny blackberry and Concord grape. Many of the other sorts have proved failures in that climate.

Materials for Mulching.—Prof. Beal gives, in the Rural New-Yorker, the results of several experiments to determine the best materials to mulch strawberries and other plants, and arrives at the conclusion that the best is chopped straw. He finds a thick coat of manure excellent for bedding plants. He tried old clover hay, and had a fine crop of clover plants to kill the next spring. Hay gives a similar result in a young crop of grass. Straw badly threshed, furnishes in the same way a young grain crop in the garden. Forest leaves held down by cornstalks, gradually blew away during winter, and the cornstalks alone remained in the spring after an open winter. Pine shavings worked into the soil, and proved a nuisance. The same objection existed with tan-bark. Clean straw, old

or new, or corn-fodder cut two inches long, less or more, answered the best purpose.

Pruning Currants.—Some writers have recommended pruning currants in summer, when in active growth. At that time the pruning would of course check the vigor of the bushes, which is not often needed, as it is rare that currant bushes grow too fast. They more usually need pushing into more rapid growth. Prune them early in spring; cultivate and manure the ground, and cut out old, crooked and stunted wood. Old and feeble bushes may be thus made to bear larger and finer fruit. If instead of one single stem to each bush, there are several, they will be likely to do better in our climate.

Rotation for Strawberries.—J. N. Stearns of Kalamazoo, Mich., said he had learned from experience that a second planting of strawberries after a previous one, always resulted in a diminished crop. Even where the plants grow freely the fruit will be poor. Thos. Wild of Berlin said that from much experience he had found that a single full crop of berries is all that a piece of land will profitably grow without a period of respite. There should be several intervening years with other crops. Clover immediately following, pastured, and finally turned under, brings the land into good condition for a second planting. Strawberries are exhaustive, and wheat after them is generally a meagre crop.

Care and Neglect.—Judge Ramsdell of Northern Michigan says that one of his neighbors raised seven bushels of strawberries on four rods of ground (280 bushels per acre), while another had only three bushels from fourteen rods (34 bushels per acre). Both were set out at the same time, with the same variety, and treated alike, except that the first was heavily mulched with compost in the fall and again in the spring.

Ornamental Raspberries.—A writer in a horticultural paper thinks that a neatly pinched in and handsomely trimmed bush of the Mammoth Cluster raspberry, when loaded with a crop of its bright red unripe berries, mixed with the shining black ripe ones, the whole relieved with its light green foliage, is as ornamental and attractive as a rose bush in full bloom.

Drying Raspberries.—A correspondent of the New-York Tribune says there is no kind of dried fruit in such brisk demand in market as raspberries, and that it is quite as profitable to dry as to sell fresh. One hundred quarts will make 30 pounds, which at 30 cents per pound, gives 9 cents per quart for the fresh fruit, less half a cent, the cost of drying. The Blackcap is here alluded to, which he states is the most hardy, reliable, and easily grown of small fruits.

Canning Fruit.—It was stated by C. A. Green, at a Rochester Horticultural meeting that in Cincinnati there were canned in 1877, 100,000 cans of strawberries, 99,000 of blackberries, 268,000 of raspberries, and 672,000 of jellies, besides apples, peaches, plums, cherries, &c. The amount of small fruits paid for and consumed in the United States yearly

was estimated at $25,000,000. The small fruits raised in Michigan were estimated at 2,795,000 bushels, amounting to at least $5,591,000.

CELLARS in winter need special attention to preserve perfect cleanliness, on many accounts. Fruit rooms, by the help of ventilating windows and a thermometer, should be kept as well down towards freezing as practicable, to prevent rotting, and to favor long keeping.

THE VEGETABLE GARDEN.

MATS FOR HOTBEDS.—W. D. Philbrick, of Middlesex County, Mass., sends to the COUNTRY GENTLEMAN the following directions: "The best mats are made hereabout in a frame like the cut, (fig. 227,) standing on legs about 3½ feet from the floor, so that a man can stand at one side to tie the strings. Rye straw is best, and should be cut a little green, and good, clean, long straw selected for the purpose. The strings are tarred spun yarn, or marline, and can only be drawn tight in cold weather in a room kept warm by a stove, as the tar is too stiff in the cold. The mat should be about 4 inches longer across than the length of the sashes; thus a 6-foot sash will require a mat 6 feet 4 inches wide. The mats are generally made 6 to 8 feet in length. A 6-foot 4-inch mat should have at least eight or (better) ten strings. The strings are cut about 5 feet long to begin a mat, and laid across the top of the frame in their places; the boards should be notched slightly with a saw at the points where the strings come.

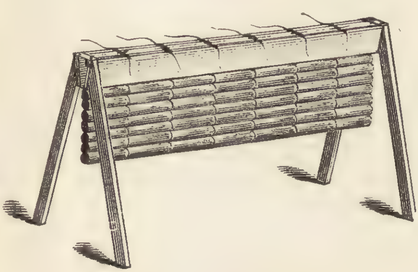

Fig. 227.

"The man takes two small handfuls of straw, and lays them smoothly on the strings with the heads inward, and ties them firmly down with a half weaver's knot. If the straw is long and good, it will lap enough in the middle of a 6-foot mat to make it even in size entirely across; but if the straw is a little short, a small handful will need to be placed in the middle of the mat to fill it up evenly. When the strings have all been tied down, the man cuts off the buts of the straw with a knife or hatchet, so that the tied bunch will slide down between the two boards which make the top of the frame, and repeats the process until the mat is long enough, when he ties it off with a full knot."

STRAWBERRIES AND POTATOES.—The London Garden gives the following mode by which a strawberry bed was planted in connection with early potatoes, with success: Beds extending across the garden, 4 feet wide were planted in spring with strawberries. On the outer sides of these beds three rows of early potatoes were planted. The potatoes were dug about the end of June, the ground cleared and raked level, where the strawberry runners could establish themselves and form a new row. The next spring, rows of potatoes were planted, one row farther off, or on the borders of the runners. The gardener thus made a traveling strawberry bed, which became wider each year without planting. The third year, the first plants were exhausted and were dug up, the bed thus moving slowly sidewise.

GREEN PEAS.—G. W. Campbell of Delaware, Ohio, gives the Practical Farmer a brief statement of his mode of raising peas, which accords with that adopted by some other successful cultivators. For a succession he formerly planted two weeks apart; but the late plantings had small crops and mildewed pods. He now plants all at a time, and as early as the season will permit, using early and late varieties. When planted deep the plants continue longer in bearing, and endure the drouth. He plants early sorts 6 inches deep, and late ones rather deeper. For this depth the soil should of course be loose and porous. His earliest is Carter's First Crop; the latest, Champion of England.

J. C. Weston of Bangor, Me., says that after a trial of 20 years he finds the following method of raising peas in small gardens the most profitable and satisfactory: A warm sheltered situation is selected and trenches are dug about 1½ feet wide and 3 feet apart; the bottom is filled with old manure which is covered with loam. The soil being light, he then sows the peas and covers them 6 inches deep with soil. After the first hoeing, the sticks are inserted for their support. The manure imparts great vigor to the plants, the depth of covering prevents the effects of drouth and the bed furnishes peas for nearly a month.

ONION CULTURE.—The Prairie Farmer sums up briefly and gives the following requisites for the successful culture of onions: High manuring, a perfect tilth, smoothness of surface, early and thick seeding in accurate drills, an early use of the weeding cultivator between and as close to the rows as possible, thinning the crop as soon as it begins to fill the drills, and the removal of superfluous plants at the second weeding, will insure success, and that at a minimum cost; and, above all, at a profit to the cultivator.

TOMATOES IN A GREENHOUSE.—An English journal mentions the successful experiment of raising tomatoes in a greenhouse, which are expected to furnish ripe fruit about the first of June. The plants grow in narrow beds on each side of the span-roofed house, and are trained up on wooden laths.

TESTING SEEDS.—The Gardener's Magazine gives in substance the

following easy method of testing turnip seed: Place on a dinner plate a circular piece of white flannel, just large enough to cover the lower part. Mix the seeds well together, so as to give a fair sample, then take up a portion of the seeds in a small spoon, place them on white paper for counting, and note the number. Spread them evenly on the flannel; then saturate it with cold water, but not cover it, and let the seeds remain thus exposed to air and light for a few days on a table before a window on the sunny side of the house. The good seeds will swell, germinate, and throw out long, slender white shoots. Count them, and ascertain how many are good. When you plant the seeds, if they do not come up as well as these, then you have either buried them too deep, or else sown them on hard, cloddy, or dry ground.

Sowing Peas in Autumn.—A writer in the London Garden says he always sows his peas in November, and by rolling the seeds in red lead, the mice do not touch them, when they appear in spring a small coating of coal ashes wards off the slugs.

Making Plants Hardy.—Nothing contributes more to rendering plants hardy, for enduring the sharp cold of winter, than a dry bottom. In the first place a dry soil induces an early ripening of the wood, and we have known this early ripening to make more difference than 20 degrees in temperature. A wet soil causes a late and watery growth, which is easily winter-killed. In the second place, trees and plants standing in a soil not soaked with water, will bear greater cold than the same trees water-soaked at the roots. It is well always to bear these facts in mind, and to act accordingly.

Keeping Cabbages.—The Iowa Register says that the practice adopted at the East, of placing cabbage heads upside down in a trench, and covering with earth, or with straw and earth, does not succeed in Iowa. The best way therefore is to cut a trench about two feet deep, in a dry spot, place a pole lengthwise over it, and suspend the cabbages, roots up, to the pole, the heads not touching the ground; then covering with straw and earth, they will keep well till spring. They will of course bear some freezing.

Blanching Celery with Tan.—The London Garden gives the practice of a successful cultivator, who uses old spent tan for earthing up. It keeps the plants free from slugs, and from the severe frosts of winter, board or slab covers throwing off the water.

Irrigating Gardens.—The Prairie Farmer describes an experiment by which a quarter-acre garden was easily irrigated, promoting the vigorous growth of vegetables, especially celery, and also cauliflower, cabbage and other succulent plants. The plants being in rows, light furrows were run between them and water poured in to reach the roots. When well soaked, the earth was thrown back and covered the wet soil. The work was done with a narrow "bull-tongue," fixed to a low frame with a wheel, used for cultivating by hand between rows. This left the bottom of the

furrow loose, and it readily absorbed the water. The object of this mode was to make a moderate quantity of water go a good way, by applying it directly to the roots.

IMPROVING EARLINESS.—A correspondent of the Tribune says that for twelve years past he has always selected for seed of the Lima beans those which are largest and first ripe. When he began this series of selection, the beans did not become large enough to eat till the 8th or 10th of September; now they are fit for eating on the 8th of August. He has pursued with success the same course with marrowfat beans.

REMEDIES FOR INSECTS.

BOYS AND BUGS.—An efficient mode for clearing destructive insects from small crops might be more extensively and profitably resorted to in the employment of boys to gather them, paying for the hundred, or measure. Those who have a quick eye and ready fingers will reach them more easily and do more than men. Try the experiment early in the season, when "potato bugs" appear, and give them a specified sum per quart. In the same way they will keep clear a patch of cucumbers or squashes, using a pan with a thin coat of molasses in the bottom to secure their prey. We discovered, many years ago, that the white grub was destroying a valuable plantation of seedling pears. Fifty cents per hundred to a few young boys brought them in, and as the insects became scarce, a double and quadruple price produced a wild excitement among the little fellows, and every straggler was cleared. The sum paid was small; the saving of the crop was of great value. The same remedy may be applied to the green cabbage worm, and when they are not numerous, the riddance is easy.

WATER AND TAR.—A correspondent of the Chicago Tribune says he has not for five years lost a cucumber, melon or cabbage plant, his remedy being to pour water into a barrel which contains a few quarts of gas tar, which impregnates the water, and this is applied with a garden sprinkler. If the rain washes it off, he repeats the application. He also asserts that it will destroy or repel the Colorado potato beetle.

HOT WATER.—It is worth while trying hot water on the currant worms and on the green cabbage worm. Take a thermometer with you, so that when you get the right degree of heat you may get it right again, as well as tell others intelligibly. It is well to try which is best—quite hot water dashed on for half a second only, or water at a lower temperature, showered on longer from the watering pot. Suppose that you actually spoil half a dozen cabbage plants, or the leaves of two or three branches of a currant bush; the knowledge you get will be likely to be worth a hundred times as much. A little practice, however, will enable any one to know just how long to let it run before hurting the cabbage leaves, by trying it on

a few of the poorer plants. We see a modification of this remedy mentioned in an agricultural paper, by heating the water to 130° by the thermometer, and adding a small handful of salt to each gallon of water, allowing it to run about four seconds. The salt is probably of little use. Water, if much hotter, must be applied very briefly, or with a dash.

P. C. Dempsey of Albury, Ontario, Can., says that water with a temperature as high as 200° may be used to destroy cabbage worms, and that it will not injure the cabbage. It is applied through a rose sprinkler. It is said that a cold infusion [decoction] of quassia, three pounds to a barrel of water, has been found effectual, and is more convenient to apply than hot water. The cabbages must be thoroughly washed from it before using.

Paraffin Oil.—The London Garden says that three wineglassfuls of paraffin oil to four gallons of water is instant death to bugs, without the least injury to tender plants. He puts the oil first into a pot, and then fills in the water vigorously with a syringe. In applying it, one man is kept lifting a syringeful out of the mixture and discharging it into itself, while another applies it to the plant. In two or three minutes it is syringed off again with clean water.

Repellants.—We always prefer the remedies which promptly kill insects to those which simply attempt to repel them; nevertheless the latter answer well sometimes. It is stated that water in which a little gas tar has been placed for a time will drive off the striped cucumber beetle, as well as lime dust, ashes or soot. Prof. Lazenby found a thin mixture of Paris green in water to be efficacious, but he prefers square boxes around the plants. He tried various remedies for the cabbage worm, but a solution of one pound of whale-oil soap in four gallons of water answered best.

Catching Curculios.—One of the best contrivances for jarring down and catching curculios, is a broad hopper on a two-wheeled barrow, the hopper being a light frame covered with oil-cloth. The advantages possessed by the oil-cloth are that it does not become wet with the dew of cool mornings, and being smooth, the insects roll down it freely into a tin reservoir at the bottom. A slit on one side of the hopper admits the trunk of the tree. The operator, with a long-handled mallet, strikes the several limbs, and jars down the insects. A defect in this catcher is that the mallet is padded so as not to bruise the bark, and this so softens and enfeebles the jar, that only a part of the curculios fall. Hence its inefficiency. The right way is to bore a small hole, about three-eighths or half an inch in diameter, into the trunk of the tree, or into each limb if the tree is large, and insert into each of these holes an iron plug, made by cutting up an iron rod. The mallet is to consist of a pole of suitable length with an iron knob at the end. This knob is struck forcibly against the iron plug by means of a forward thrust, and the sharp jar thus given brings down all the insects. This mode of jarring the tree should be

employed in all cases, and is more rapid and more effectual than the padded mallet. Wide "factory" sheets, stiffened with light frames, answer well for catching the insects, and they are rendered more effectual and durable by oiling.

The Cabbage Worm.—At the Montgomery County (Ohio) horticultural meeting, M. D. Egbert said he had found warm soap-suds a complete remedy for the cabbage worm. Mrs. Ramsay said that at a temperature of 125° the cabbages would not be injured. Mr. Broadwell had found common soap-suds a perfect remedy if applied while the worms were small, and early in the morning,

The Currant Worm.—A writer in the Tribune thinks it important to dust the hellebore on the underside of the currant leaves, where the worms feed, and where it will not be washed off. He takes thin cotton cloth, that the powder will pass through sparingly, about ten inches square, encloses the powder, gathers the corners and sides, and ties around the end of a stick three or four feet long. The bushes are opened early in the morning, and the dusting is done upwards or sidewise, the wind, if any, assisting.

The Cucumber Beetle.—A writer in the Rural New-Yorker says that he has successfully repelled the insect commonly known as the striped bug by applying ashes soaked in kerosene. A handful is applied at the centre of each hill. Its strong odor compels them to beat a retreat.

Insects on House Plants.—The Scientific American gives in substance the following mode of destroying insects on house plants: Place the pots on a table or platform on which there is an inch or two of sand. Cover them with any inverted vessel, the sand making the edges fit closely. Or place over them a light frame or support, and cover them with a cloth. Then burn tobacco under the cover, and let the smoke remain fifteen minutes. This is better than syringing, because the smoke penetrates every corner and crevice. The same journal states that when the open soil is infested with insects, caused by a free use of fertilizers, a good remedy is to cover it when dry with a fourth of an inch of soot, and water liberally, which kills the insects and leaves the plants.

Destroying the Green Fly.—An Illinois correspondent of the Gardener's Monthly states that the green fly attacked his plants in the dwelling-house where tobacco smoke could not be used. He procured a handful of lady bugs and placed them on the plants one evening. The next morning not a green fly was to be seen.

Plants in Flower Pots.—The use of mustard water for repelling or destroying insects in the soil of flower pots, has been recently recommended—a tablespoonful of mustard to a gallon of water. A greater degree of strength would probably be more effectual; pungent vegetable matter not injuring plants.

Insects on Roses.—When it is not practicable to employ the disagreeable fumes of tobacco, which otherwise are the best remedy for

insects on the rose, Ellwanger & Barry adopt the following: Boil 4 ounces of quassia chips 10 minutes in a gallon of soft water, and after straining add 4 ounces of soft soap, which should be dissolved as it cools, stirring well before using. With a small, clean painter's brush, apply it to every infected leaf and shoot. In 15 or 20 minutes wash the plants with pure water. Tobacco may be used instead of the quassia. For some insects a sprinkling of powdered white hellebore will destroy or disperse them, the plants being previously well moistened. The rose caterpillar, which glues the leaves together, must be killed by pinching between the thumb and finger.

The Rose-Bug.—Peter Henderson gives in the Gardener's Monthly, some interesting statements on the habits of the rose-bug. John May of Madison, N. J., after years of perseverance, has entirely cleared his plants, and his roses are now perfect models of health and vigor. He finds that no substance will destroy the insect in the larval state without injury to the plant. They feed at the roots, and when symptoms of their presence are observed, the only course is to dig up the plants by the roots. The symptoms are weak growth, pale shoots, and few or no flowers. But the remedy is to destroy the perfect insect under the leaves, always fewer in number than the grubs; their presence is not commonly observed by those who only view the leaves from above. They crawl down and deposit their eggs at the roots.

Rose Slug.—A correspondent of Colman's Rural World gives the following mode for destroying slugs on rose bushes: I have a considerable number of roses in my garden, which, during the last two summers, have presented as fine an appearance in leaf and flower as they did before the advent of the rose slug. Their healthful condition was produced by the prompt use of powdered white hellebore, prepared in the following manner: One tablespoonful steeped in hot water for ten minutes, diluted in five quarts of cold water, and applied through a syringe or fine rose of a watering can to the foliage while still moist with dew. Two applications three or four weeks apart, will effectually repress the slug each season. Four ounces of hellebore per annum will keep one hundred plants of average size in good condition. Of course hellebore should be used with caution, as it is an active poison.

Applying White Hellebore.—A successful manager uses the following to destroy the rose slug, which mixture does not injure the plants: Add to a pail of water, half a pint of soft soap and four ounces of white hellebore. Throw it on the under side of the leaves every morning with a garden syringe. Watch for the insects in June and August. The soap assists in the adhesion of the mixture to the leaves, and as the insects work on the under side, the syringe applies it where wanted.

Damage by Insects.—The annual products of the soil in the United States are estimated at $2,500,000,000. Of these at least $200,000,000 are yearly destroyed by insects. Yet some of the most wealthy States can-

not afford a thousand dollars or two, as salary to an entomologist to study the habits of these destroyers, and to furnish the most expeditious methods for saving the crops!

DOOR-YARD PLANTING.

THE ACCOMPANYING PLAN for a village lot (fig. 228) was furnished by a correspondent of the COUNTRY GENTLEMAN, and was intended to give those not familiar with designing and laying out grounds, distinct and specific directions what trees to select, and where to plant each one, and where to place the several flower beds and the shrubbery. The letters upon the plan correspond with the same on the list of trees and plants:

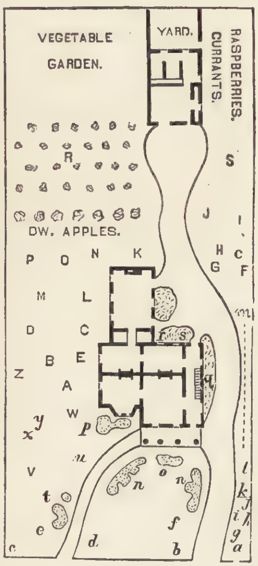

Fig. 228.

a, Purple-leaved maple.
b, Norway maple.
c, European sycamore maple.
d, Cut-leaved maple.
e, Red or scarlet maple.
f, Double-flowering horsechestnut.
g, Imperial cut-leaved alder.
h, White-flowering dogwood.
i, Magnolia purpurea.
j, Mahaleb cherry.
k, Magnolia glauca.
l, Pavia whittleyi or purpurea.
m, Hedge of Siberian arbor vitæ, or of hemlock.

nn, Beds to be filled with ever-blooming roses, geraniums, and other brilliant summer-blooming plants. In winter to have branches, or small trees, of evergreens placed in the ground, the tallest in the centre of the beds, toning every way toward the surrounding turf.

p, Plant this bed with hyacinths, crocus, tulips, lilies, &c.; in a word, with flowering bulbs. In planting, do so at different times with each class, unless it be lilies. Leave also spaces into which at any time you can plant flowering plants for the season. Use more or less of vinca, and some low creeping vine like Juniperus prostrata for border and covering in winter, while in summer the vines may be trained where best to give other plants space.

q, All this space between the road and house (leaving a turf border of 1 to 1½ feet, all next to the road), plant with varieties of hardy-flowering deciduous shrubs, placing the strongest in the rear of the bed, containing,

if correctly done, a rise from one foot next the road all around toward the house and centre of the plat.

r, Purple fringe tree.

s, Varieties of barberry; and after the plants are established let turf grow over the plat.

t, Bed to be filled with perennials and annuals, such as phlox, milfoil, columbines, spireas, daisies, bocconia, buphthalmum, campanulas, larkspur, dicentra, iris, poppy, etc., and annuals to suit.

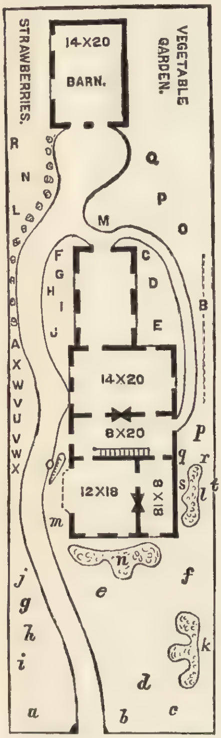

Fig. 229.

u, Cut-leaved weeping birch.

v, Purple-leaved beech.

w, Cembran pine.

x, Corsican or yellow pine.

y, American white spruce.

z, American black spruce.

A, Lawson's cypress.

B, European silver fir.

C C, Norway spruces.

D, White pine.

E, Red bud or Judas tree.

F, Shad blow or June berry.

G, Strawberry tree or burning bush.

H, Early Richmond cherry.

I, Black Tartarian cherry.

J, Rockport cherry.

K, Red Jacket cherry.

L, Early purple Guigne cherry.

M, Elton cherry.

N, Louis Philippe cherry.

O, Coe's Transparent or Elliott's Favorite cherry.

P, Black Hawk or Pontiac cherry.

R, Twenty-seven Dwarf pears of varieties 8 feet apart each way.

S, Peach trees, eight in number.

Another design for a smaller lot is given in fig. 229. The positions of the trees are given in the following list:

a, Mahaleb cherry or magnolia glauca.

b, Norway maple or double-flowering horse-chestnut, or common chestnut, or linden, or butternut, or a French or Spanish marron.

c, American beech.

d, European flowering ash.

e, Cut-leaved weeping birch.

f, American white or black spruce, or Austrian pine.

g, Sassafras or ever-flowering weeping cherry, or June berry, or shad blow, or hop tree, or double-flowering plum, or purple fringe tree.

h, Red bud or strawberry tree.

i, Lawson's cypress or Cembrian pine.

j, Magnolia purpurea, or gracilis.

k, Group of dwarf flowering shrubs, such as spireas, deutzias, Japan

quince, Forsythii; mingling dwarf arbor vitæ and junipers, so as to make the group good in winter. When planting set the lowest near the front, and on the points of the bed.

l, Snowball, wiegela rosea, alba and Desboisii, sweet-scented shrub, white fringe, Stuartia, some one variety of elder, hydrangea paniculata flore pleno, upright or Tartarian honeysuckles. All these plants want clipping back directly after having bloomed, one-third of the year's growth, together with all the year's seed vessels. In this way the group may be kept with the white fringe as a centre, and a fall every way from it.

m, Halesia tetraptera or snow drop tree.
n, Bed of perpetual roses, geraniums, verbenas, &c.
o, Bed for bulbs of sorts.
p, Hemlock.
q, Siberian arbor vitæ.
r, Chinese arbor vitæ.
s, Weeping arbor vitæ, var. filiformis.
t, Weeping juniper.
U, Tom Thumb arbor vitæ.
V V, Juniperus nana.
W W, Juniperus japonica.
X X, Juniperus sabina.
A, Juniperus prostata or repens.
B, Row of raspberries.
C, Row of gooseberries.
D, Dwarf apple trees.
F to *J*, Dwarf pears.
L, Rockport cherry tree.
M, Black Tartarian cherry tree.
N, May Duke or Louis Philippe cherry tree.
O, Red Jacket cherry.
P, Standard Bartlett pear.
Q, Standard Seckel pear.
R, Red Dutch currants.

All the ground in the rear of the back line of the house may be used as a vegetable or kitchen garden.

EXPERIMENTS WITH POTATOES.

THERE ARE ERRORS in opinions and practice which have long prevailed among farmers, and which one copies from others without submitting the questions to actual and measured experiments. In order to point out distinctly some of these errors, the following trials were made, mostly through several successive years:

CUT AND UNCUT POTATOES.—The skin of the potato is nearly impervious to moisture, and so long as it remains entire, the water is retained within, and the tuber is a long time in shriveling. As soon as cut, the moisture escapes rapidly. If, therefore, the ground is dry and cloddy,

and the time of planting late, it is best to plant the potatoes whole. If cut pieces are used as seed, it will be found that many of them dry up and fail to grow, and the crop is broken by vacant spaces. By early planting in rich and mellow ground, the moisture is retained in the cut pieces, and all grow freely; and the advantage derived from cutting, namely, fewer stalks and fewer and larger potatoes, are secured without difficulty.

Large and Small Potatoes.—Medium sized and large potatoes always give a heavier crop than quite small ones, when other controlling circumstances are the same. The larger amount of nutriment which the young shoots derive from the tuber, give them an earlier and more vigorous start; yet, under proper management, the difference is much less than is commonly supposed, or that which follows careless cultivation. In one experiment, we tried in alternate rows the planting of tubers which were not more in diameter than a man's finger, in one row, and those double the size of hen's eggs in the next, and so on over a considerable area. Fig. 230 shows the relative sizes on a reduced scale. Special care was taken that whether large or small, each piece had the same number of eyes. Mistaken conclusions are often drawn by cutting the smaller potatoes into fewer pieces, as a common laborer will be sure to do, unless special attention is given to this point. The consequence is, more sprouts spring up from the small potatoes, and the resulting crop is more numerous in tubers, and they are smaller in size. The conclusion that it is the small seed that necessarily produces small potatoes, is obviously an erroneous one. A small inserted graft, or a small tree when set out, does not yield afterwards smaller apples than a large graft or large tree—all depends on the culture given. In the experiment with the small and large potatoes, care was taken to secure a deep, mellow, moist soil, and to plant them so early that there could be no failure from drouth. They came up nearly at the same time, and the appearance of the rows was similar through the season. When the potatoes were dug, the contents of each row were placed in heaps at the end and examined. No perceptible difference was observed in the size of the potatoes; but when they were measured, it was found that the large potatoes yielded 11 per cent. the most—doubtless owing to a stronger growth of the shoots at the outset. In another experiment the smaller potatoes gave the larger crop. The reasons were these: The large seed was cut and planted with so few eyes, that the number of plants in the rows were too few for the best product. The same care as above mentioned was not taken to have the same number of eyes in both cases, and

Fig. 230.

the men who cut and planted gave double the number of eyes to the pieces from the small seed. The crop in these rows consisted, therefore of a much larger number. The small tubers were about half the size of hen's eggs; the large ones five or six times as large. The rows from the small seed yielded nine bushels from each of the rows; those from the large seed only eight bushels.

The experiment is given in detail to show the importance of taking the controlling influences into account. One reason why experiments so often give contradictory results is that the amount of the crop is blindly given, without observing all that may have operated on it.

Hilling.—A number of experiments have been carried out for determining the comparative advantages of hilling up the earth about the plants, (which is nearly the universal practice,) and cultivating with a flat surface. The latter has invariably given the largest crops. The percentage of loss varies with the depth of the soil and the abruptness of the hilling. When done thoroughly, the loss is about 16 to 18 per cent.; when the hilling is moderate, it is correspondingly less. The average from common practice, is from 12 to 15 per cent., and millions of bushels are annually lost in this way throughout the country.

Fig. 231.

The rationale of this result is that when fresh earth is heaped on the roots near the plants, they are buried too deep, while the ends of the roots are denuded or torn, fig. 231, the dotted line being the natural surface. When cultivated flat, all have a free and natural growth.

Depth of Planting.—Potatoes should not be planted shallow. A deep soil, and moderately deep planting, afford more security against changes of moisture and dryness. We find that when the planting is about 5 inches deep, about 10 per cent. more potatoes are given than when planted only 2 or 3 inches deep; but the result will vary much with the depth and condition of the soil, and the moisture and drouth of the season.

Change of Seed.—The experiments under this head have been limited. It is well known that certain varieties succeed much better in some localities than in others, and variously yield more or less, or give better or poorer potatoes. In some places certain sorts "run out" sooner than in others. It may therefore be expected that when a variety has deteriorated in product in one place, an advantage would result for a time from procuring seed potatoes from neighborhoods where it succeeds better. The only distinct experiments we have tried were the following: The Early Rose having diminished from its early abundant yield, seed was procured a few years ago from a neighborhood seventy miles east. The

crop from this seed was about 10 per cent. more than from the old seed planted side by side. A quantity of seed of the Late Rose was brought from sixty miles west, and planted side by side with seed which we had raised from its first introduction. While rows from the old seed gave each 10 bushels from the row, the seed from a distance yielded over 13 bushels from each row; in both instances, with much uniformity in the several rows. It is proper to add that in both cases the places from which the seed was brought are regarded much better in soil for potatoes than the ground on which the experiments were made.

ITEMS IN FLORICULTURE.

FINISHED FLOWER BEDS.—We noticed in a former volume the beds of geraniums, colored-leaved plants and of the sempervivums, on the grounds of Messrs. Ellwanger & Barry, at Rochester. As they

Fig. 232.

have given special attention to this kind of planting, we furnish engravings of a few, with lists of the plants occupying them. It should be understood that such beds are not for picturesque grounds, but only for such as approach the geometric style with high and elaborate finish.

A vase of plants stands in the centre of a smooth bed planted chiefly with the dense rosette-formed plants of the Crassulaceæ (fig. 232.) The outer circle is *Sempervivum globosum ;* the second, *S. californicum ;* the

third, *Echeveria secunda* and *secunda glauca;* the centre, *Echeveria metallica.* The symmetrical characteristics of this bed, situated in the smoothly shaven grass, with the vase at the centre, present altogether a striking appearance, and such beds strictly belong to the more symmetrical and finished portions of ornamental grounds.

Fig. 233.

Fig. 233 is the plan of a bed of geraniums, about 25 feet in diameter, which, when in full bloom, presents a rich variegated appearance, each sort occupying a broad surface of the bed. The outer circle is formed of a low, profuse-blooming Lobelia and the circle is at all times a distinct blue. The next circle within is the light *Pyrethrum aureum.* The centre of all is the brilliant scarlet geranium known as the Hector; the opposite

Fig. 234.

wings, *a a,* are planted with the pink Master Christine; the wings *b b,* with the cherry-colored Marshal Vaillant, and the four triangular spaces between with the silver-leaved geraniums.

Fig. 234 represents imperfectly an oval bed of colored-leaved plants, slightly convex, and set with the following plants: In the centre is Coleus

Hero, which is almost black; next is *C. verschaffeltii*, crimson; the third circle is the Golden Gem; the fourth *Achyranthes caseii;* the fifth, the white leaved *Centaurea candida;* and the outer circle, a variety of *Mesembryanthemum cordifolium.*

LAYERING CARNATIONS IN CUPS.—It is in cups of well-rolled lead, according to the *Fleurs de Pleine Terre*, that the celebrated cultivator of carnations, M. Gouthier of Pierrefitte, has so successfully practiced their propagation by layering. The lead used for these cups is rolled out to the thickness of strong paper, and then cut into triangular bands. These are formed around the finger to a shape somewhat like a small sugar paper (fig. 235.) The soil employed is fine, and the same as that used for culture in pots; threads serve to support the cups in position, and a pin thrust through helps to secure them and keep the layer in position.

Fig. 235.

Common tinfoil would doubtless answer the same purpose, although not quite so pliable as lead.

CUTTING-POTS.—The following mode of propagating by cuttings was furnished by a correspondent to the London Garden, and appears to be a useful contrivance: Those who find their pelargoniums and other cuttings

FIG. 236.—*Section of a Pot containing Pelargonium Cuttings.*

to suffer from damp, should try the method indicated in the accompanying illustration (fig. 236.) The damping off of cuttings usually results from applying water by pouring it on the surface of the soil, and allowing it to

percolate through, but if a small pot be sunk in the middle to receive it, moisture will be supplied where it is of most use; the quantity can always be regulated, and the cuttings are not so likely to suffer so much from an occasional overdose as they otherwise would. The best pots for pelargonium cuttings are those whose width exceeds their height. The section, which is taken vertically through the middle of the pot, shows the cuttings, two only of which appear; the mould in which they are planted should contain plenty of silver sand, a thin layer of that material resting on a layer of cocoanut fibre, and below that a quantity of corks or washed cinders to insure perfect drainage.

Improved Propagation by Cuttings.—Peter Henderson describes an improved mode he has been using for the propagation of geraniums. His object was, in the first place, to avoid the exhaustion of the parent plants by the removal of cuttings abruptly; and secondly to make sure work. He takes the young shoot which is to be used as a cutting, and snaps it short, leaving it hanging by a small portion of the bark, as shown in fig. 237. This shred is sufficient to sustain the cutting, without any material injury from wilting, until it forms a callus, which precedes the formation of roots. In from 8 to 12 days it is detached and potted in 2 or 3-inch pots. It is rather less shaded and watered than ordinary cuttings, and forms roots in about 8 to 12 days more. One autumn Mr. H. propagated about 10,000 plants of the tricolor class, without losing one per cent. With the common method, he thinks he would have lost 50 per cent.

Fig. 237.

This mode is applicable to the Abutilon, Begonia, Carnation, Cactus, Lantana, Oleander, &c., by using young unripened shoots. If the shoot does not break, but simply bends to a knee, a knife may be used for cutting about two-thirds through.

Striking Cuttings—Easy Mode.—The Rural New-Yorker gives in substance the following method, which has been found remarkably easy:

Take a flower pot about 8 inches in diameter, invert a saucer within it large enough to rest against the sides half way down, or lower, which is better than using broken crocks or stones. This drainage is necessary where there is no bottom heat. Then fill to the brim with very coarse sifted sand. Place the pot in a strong light, and saturate the sand a few hours with water, providing a proper vessel for drainage. Make the cuttings from 2 to 5 inches long, retaining more leaves in autumn than earlier, but stripping them off nearly to the top, and insert them half an inch in depth, about twenty to the pot. New buds in time will show that roots are formed, when they are to be lifted out with a teaspoon, and set in

small pots of rich sandy earth, avoiding clayey soil, which will become too hard. If too many leaves are left on the cutting, they will be likely to droop. September is a good time for this work.

TESTING SEEDS.—One of Mr. Vick's correspondents gives the following as his way of testing seeds: A sod cut from an old pasture is placed grass up in a pan or on a board, and boiling water poured on; on this is is laid a piece of straw paper, and the seed is sprinkled on this and covered with another paper, then another sod, grass down, well wet with warm water. Keep wet and warm, and in a few days the seeds, if good, will sprout.

COCOANUT FLOWER-POTS.—Some of the Centennial exhibitors used, with great success, the shell or husk of the cocoanut, in the manufacture of flower pots. This husk, which is nearly an inch thick, is cut across the middle, so as to make two baskets, and each portion is suspended by wire. Its porous character seems to fit this material to this purpose, and its ornamental appearance, with something of a rustic character, makes it superior to the most ornamental porcelain. Plants are said to thrive admirably in these pots.

PAPER PROTECTORS AGAINST FROST.—When house plants are kept in common rooms, it sometimes happens that an intensely cold night threatens to injure or destroy them. When this danger is feared, place them anywhere together, the centre of a room on the floor being the most convenient, and then put one or two thicknesses of newspapers over them, pinned around them. They will then bear several degrees more of frost than without the papers. A similar protection may be afforded to plants in the open ground to guard against spring frosts, by nearly covering with newspapers, on the corners of which small stones are laid.

WINTER BLOOMING OF GLADIOLUS.—A Boston correspondent of the Gardener's Monthly recommends, in substance, the following mode for obtaining winter flowers trom the Gladiolus: Plant the bulbs about the middle of July in a rich, open border. When a foot high, and in dry weather, pot them. Before frost, remove to a sunny window in the house, and keep them well watered.

HYACINTHS IN WINTER.—James Vick remarks, in his Illustrated Monthly, that it is important to keep hyacinth bulbs cool and dormant before planting in autumn, in order that the new growth may not start and consume and dry up the bulb, on which it must entirely depend before planting. If planted in earth and kept in a cool place, roots will form and furnish nutriment, and the bulb will not then be exhausted and ruined. When planted in water, roots are formed, but the new plant must exhaust the bulb more or less for nutriment, and hence the reason that bulbs in water-glasses are so weakened that they do not do well a second year. Hence the superiority of the method of planting in soil in pots.

HYACINTHS IN MOSS BASKETS.—Hyacinths in water, and in soil in

pots, are common ornaments for winter. Peter Henderson describes the mode for placing them in moss baskets. He recommends the common brown water-moss used by nurserymen and gardeners, but for the outside and the top we would prefer the smooth green flakes taken from rotten logs in the woods. Press the moss moderately firm into the wire basket, the bulbs being one-third above the surface. The whole is then saturated with water, and placed in some dark, cool place, as a cellar or closet, where the temperature is not above 50°. In five or six weeks the roots will fill the moss. The basket is then brought into a room and hung against a window, with a temperature of 60° or 70°, and the plants will bloom in three or four weeks. Watering them with very weak guano water once a week greatly increases their size and brilliance ; an ounce of guano to a gallon of water is enough. The bulbs may be prepared successively from November into January.

EARLY FLOWERS.—A young gardener wishes to know what flowers may be employed for the earliest blooming in spring. The following are very early bloomers: Pansy, snowdrop, crocus, Siberian squill, the wild hepatica, the earliest primroses, and the claytonia. The snowdrop, crocus and squill, being bulbs, must be set out the previous autumn; the others when in a dormant state.

The London Garden describes a good method of mixing spring flowers with bedding plants to produce a beautiful effect. Small beds of Siberian squill have borders 8 or 10 inches wide of *Narcissus minor;* and such bulbs as die down in summer, like squills, anemones, jonquils, &c., may be dug up every third year and the soil enriched. Summer bedding plants may be placed between and occupy their places. A bed of anemones has a bed of verbenas growing through it. If heavily top-dressed in autumn, they do well.

ROSES IN WINDOWS.—The Agriculturist gives the following as the essential requisites for growing roses in rooms, which we condense; Selecting the best fitted sorts of plants raised and kept in pots, and not from open ground, keep in a room not too dry, at a temperature of about 70° in the day time, and 50° or more at night, using liquid manure if the soil is poor, avoiding over-watering or soaking with standing water, showering once or twice a week, and turning the ball of earth out sometimes to see if there are angle worms, or watering with lime-water to repel them. Remove plant lice with tobacco water. Cut back a shoot that has blossomed, to a good bud. Avoid cold drafts, which cause mildew. Fork up the soil and keep it mellow.

THE BEST ROSES.—A gentleman of intelligence and very familiar with the great collection of roses in the nursery of Ellwanger & Barry of Rochester, sends us the following lists of the best hybrid perpetuals: For the best six—Alfred Colomb, large, full, brilliant crimson, fragrant: Madame Victor Verdier, large, crimson, moderately full; John Hopper, bright rose; La France, silvery rose, globular, highly fragrant, constant

bloomer, slightly tender; Countess Cecile de Chabrillant, deep pink, full, perfect in form; Charles Lefebvre, reddish crimson. For the best twelve, add to the preceding list the following six: Louis Van Houtte, Senateur Vaisse, Ferdinand de Lesseps, Marie Baumann, Prince Camille de Rohan and Marquise de Castellane. Next after these, for a larger collection, are named General Washington, Caroline de Sansal, Anne de Diesbach, Victor Verdier, Maurice Bernardin, Duke of Edinburgh, &c.

The following hardy varieties are given by W. H. White of Massachusetts, in a paper read before the Massachusetts Horticultural Society, and recommended as adapted to New-England: *Hybrid Perpetuals*—Alfred Colomb, Charles Lefebvre, Countess Cecile de Chabrillant, John Hopper, La France, and Madame Victor Verdier. *Miscellaneous*—Queen of Prairies, Blanche Fleur, Madam Hardy, Persian Yellow.

Thrift for Window Pots.—This well-known plant (*Statice armeria*), which was once extensively used as an edging to garden beds, is pronounced by James Vick one of the best flowering plants for pots in windows, withstanding, as it does, very hard usage. He chopped a mass of it out of the frozen ground one winter with an axe, and potted it in his office, where, under good care, it made a fine round mass after some weeks, and bloomed freely. It was subsequently much neglected, but a good watering at any time immediately restored it.

Virginia Creeper.—The London Garden speaks in strong terms of admiration of this climber (*Ampelopsis*), and states that on the Continent, it is largely employed to decorate structures, and is seen falling "in immense sheets over walls, banks and bridges." In a private garden, an iron-covered trellis is completely sheeted with the Virginia creeper, displaying "immense walls of rich and glowing colors."

Orchids.—The London Garden mentions the following species of American orchids as being well worthy of cultivation. Some are quite common in our woods and bogs, and others are more rare: *Cypripedium spectabile*, *C. acaule*, the common *C. pubescens*, and the rare *C. candidum*. Also the well-known *Calopogon pulchellus* and *Pogonia ophioglossoides*; the rare *Arethusa bulbosa*, *Orchis fimbriata*, and the variegated-leafed *Goodyera pubescens*. The rare and beautiful *Calypso borealis* is also mentioned. All these beautiful or curious species are worthy of more attention than they receive in this country, while English horticulturists prize them highly and give them special care.

Ornamental Shrubs.—The Iowa Horticultural Society gives the following list of shrubs, which bear red berries, and which present an ornamental display late in the autumn or into winter: High-bush cranberry, strawberry tree (*Euonymus*), mountain ash, buffalo berry and bittersweet (*Celastrus*). To these we add the barberry, which gives a profusion of scarlet berries nearly all winter; and the *Prinos* (black alder), which is nearly unequalled in its crimson masses till spring; and although growing in mucky swamps, succeeds quite as well when removed to upland.

THE METRIC WEIGHTS AND MEASURES.

By D. A. A. Nichols, Albany, N. Y.

THE USE OF STEAM AND ELECTRICITY has made all the civilized nations of the earth in a great measure cosmopolitan, producing unity of thought, aims and purposes. The producer in every land sells his products in all the great markets of the world, and is brought into more or less direct contact with far off as well as neighboring consumers. The commerce of the present day requires familiarity with the products of all nations, and their relative values. In order to buy or sell intelligently and profitably, producers and merchants must readily and quickly comprehend the comparative weights, measures and money of all nations with whom they do business, or are likely to. Formerly each nation had a system (or rather set, as no system was observed) of weights and measures, in the use of which they had been educated, knowing or caring for no other. This was true, even of nations claiming to be enlightened, whose merchants penetrated into all parts of the earth. England, for example, until within a short time, had a bushel the contents of which varied greatly in different counties in the kingdom. The measure called a gallon was of four different sizes, according to whether a wine, beer, dry or imperial gallon was used. These respectively contain 231, 282, 268.8 and 277.274 cubic inches. A pound contains 5760 or 7000 grains, according as troy or avoirdupois weight is meant.

Nearly as much confusion prevails in the United States. According to the United States laws, the "Winchester" bushel is the standard of dry measures, and this contains very nearly 2150.4 cubic inches. In the State of New-York the legal bushel is the English "imperial" bushel, containing 2218.192 cubic inches. A seedsman buys timothy seed in Illinois at 45 pounds to the bushel, and sells it in the Eastern States at 44 pounds to the bushel, and both are legally correct weights. The bushel of barley varies in the different States from 45 to 50 pounds, and that of oats from 30 to 36 pounds. It is evident, therefore, that there is no system or standard in common use in these countries.

Between the years 1790 and 1795 a committee of members of the French Academy of Sciences, in obedience to a request of the government, devised the system of weights and measures known as the "metric system," in order to make commercial transactions more intelligible to the people in all parts of the empire. The points aimed at were to have a single standard for all weights and measures, (such standard to be readily ascertained at any time) and to have as few terms as possible. The committee selected the ten-millionth part of the distance from the equator to the pole as the standard, and called it the *metre*, (from the Greek *metron*—a

measure,) being equal, very nearly, to 39.3707904 inches of the English standard.

The system was legalized in France in 1795, and since 1840 there have been penalties attached to the use of any other. It was legalized in England in 1864, and in the United States in 1866, but has not been made compulsory in either country. It is commonly used all over the Continent of Europe, and is in universal use by scientific men in most of their calculations. It is easily learned, as only about twelve different terms are needed; and calculations under this system are simple, as it is a decimal one. The only trouble with the system is in ascertaining the exact length of the metre, but the astronomers of the present day have established the length of a great meridian very closely, so that there is no great trouble in fixing the length of the metre.

In forming tables of weights and measures in this system, the unit of each kind is increased by using Greek prefixes, indicating the increase of value. Ten metres are called a dekametre, one hundred metres make one hectometre, a thousand metres are called a kilometre, and ten thousand metres make a myriametre. One-tenth of a metre is called a decimetre, one-hundredth of a metre is a centimetre, and one-thousandth of a metre is a millimetre. These prefixes are derived from the Latin. The unit of weight, called a gramme, and that of capacity, called a litre, are increased and decreased in the same manner, and by the use of the same prefixes.

After these are once learned, there is no more trouble in reckoning commercial transactions in which the metric system is used than in the simplest problems in addition, subtraction, multiplication or division, as only the Arabic or decimal notation is used. The measures of surface have for the unit the *are*, and for those of solids the unit is the *stere*. The *are* increases and decreases, of course, by hundreds and hundredths, (the square of ten and one-tenth,) so that we have no dekare, but only the hectare (or 100 ares) above the unit, and only the centiare below it. Except in land measurements, the are is not used, the square metre being the ordinary unit of surface. The stere is only used in measuring wood and solid timber, the cubic metre being the unit otherwise, or rather the cubic centimetre in all except large measurements.

The standard *metre*, by which all others are determined, is a rod of platinum, kept in the national archives at Paris, which rod is only exact at the temperature of 0° centigrade (32° Fahrenheit), the point at which ice melts. The United States and England have each an exact copy in the same metal. Scientists use rules of two decimetres (one-fifth of a metre) in length, graduated to millimetres, and for very fine work these graduations are subdivided. Carpenters, masons and mechanics use rules similar in form to those graduated into feet and inches, graduated as finely as the nature of their work requires.

In measuring dry goods, a wooden metre is used, graduated to decimetres only. Surveyors and engineers use tapelines and chains ten

metres long, and graduated as finely as needed. The kilometre is the unit of distance, and stones or posts along the highways are put at that distance apart. The unit of capacity is the *litre*, which is equivalent to a cubic decimetre (one-thousandth of a cubic metre), and the hectolitre is the ordinary measure used in buying and selling grain, roots and other farm products, including wine and oil. The unit of weight is the *gramme*, which is the weight of one cubic centimetre of distilled water at the level of the sea, and at its maximum density —4° centigrade; 39.83° Fah.—weighed in a vacuum. The kilogramme—1000 grammes—is the ordinary unit of weight in commercial calculations. It will be seen that when once the length of the metre is obtained, all the weights and measures in this system may be readily determined by it. The system is therefore called the metric system.

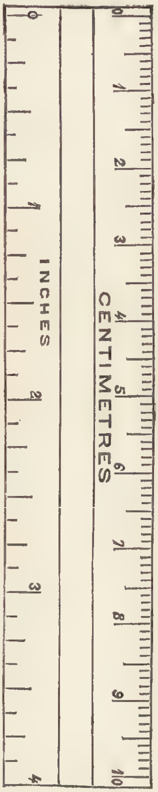

Fig. 238.

The reduction of the metric to English measures is comparatively easy. A metre is 39.3707904 inches; a dekametre is ten times as much; a hectometre one hundred times; a kilometre one thousand times, and a myriametre ten thousand times as much. A decimetre is one-tenth of a metre, equal to nearly 4 inches; a centimetre is one hundredth, or four-tenths of an inch, and a millimetre is one-thousandth of a metre. The are, in land measure, is ten metres square—100 square metres; 119.411 square yards, or 0.0247114 of an acre—and a hectare is therefore 2.47114 acres. A cubic metre is 35.31481 cubic feet. The kilogramme (1000 grammes) is 2.20462125 pounds avoirdupois. The common nickel 5-cent coin weighs just 5 grammes, and measures 20 millimetres in diameter.

The changing of the litre into English measures of capacity causes the most trouble, as we are compelled to calculate for gallons of several sizes. The litre contains 61.027053 cubic inches, and the gallon dry measure has 268.8 cubic inches. Wine measure has a gallon of 231 inches, and the imperial gallon has 277.274 cubic inches. These being taken into account, the reduction of the French to English measures is easy. In order to render the comparison of the two measures plainer, fig. 238 is given, showing on one side one-tenth of a metre (one decimetre, or ten centimetres) graduated to millimetres, like the rules in ordinary use by mechanics, and on the other edge is the English standard of four inches

long, also divided as usual. Five nickel five-cent pieces laid edge to edge along a straight line will cover the same length as the metric rule in the figure. Boxwood rules twice the length, and graduated like the cut, can be obtained in all the large cities in this country at about 25 cents each. Ivory rules cost six or eight times as much.

The following are the complete tables of the metric system, with their equivalents in English measures :

Measures of Length.

				English Equivalents.
10 Millimetres	=	1 Centimetre	=	0.3937 inches.
10 Centimetres	=	1 Decimetre	=	3.937 inches.
10 Decimetres	=	1 METRE	=	39.3707 inches.
10 METRES	=	1 Dekametre	=	32 feet, 9.708 inches.
10 Dekametres	=	1 Hectometre	=	19.8842 rods, or 109.363 yards.
10 Hectometres	=	1 Kilometre	=	0.62137 mile.
10 Kilometres	=	1 Myriametre	=	6.2137 miles.

Measures of Capacity.

				Dry Measure.	*Wine Measure.*
10 Millilitres	=	1 Centilitre	=	0.6102 cub. in.	0.338 ounce.
10 Centilitres	=	1 Decilitre	=	6.102 cub. in.	0.845 gill.
10 Decilitres	=	1 LITRE	=	0.908 quart.	1.0567 qts.
10 Litres,	=	1 Dekalitre	=	9.08 quarts.	2.6417 gal.
10 Dekalitres	=	1 Hectolitre	=	2.8375 bush.	26.417 gal.
10 Hectolitres	=	1 Kilolitre	=	1.308 cub. yds.	

Measures of Weight.

				Avoirdupois.
10 Milligrammes	=	1 Centigramme	=	0.1543 grain.
10 Centigrammes	=	1 Decigramme	=	1.5432 grains.
10 Decigrammes	=	1 GRAMME	=	15.4323 grains.
10 Grammes	=	1 Dekagramme	=	0.3527 ounce.
10 Dekagrammes	=	1 Hectogramme	=	3.5274 ounces.
10 Hectogrammes	=	1 Kilogramme	=	2.2046 pounds.
10 Kilogrammes	=	1 Myriagramme	=	22.0462 pounds.
10 Myriagrammes	=	1 Quintal	=	220.4621 pounds.
10 Quintals	=	1 Tonneau	=	2204.6212 pounds.

Measures of Surface.

1 Centiare	=	1 square metre.	=	1550 square inches.
1 ARE	=	100 square metres.	=	119.6 square yards.
1 Hectare	=	10,000 square metres.	=	2,471 acres.

Measures of Solids.

1 Decistere	=	100 cubic decimetre.	=	3.53144 cubic feet.
1 STERE	=	1 cubic metre.	=	0.27590 cord of wood.
1 Dekastere	=	10 cubic metres.	=	13.07900 cubic yards.

The *are* and its compounds are only used in measuring land, as we use acres and rods. The *stere* and its compounds are used in measuring wood and lumber only.

The following table will be found useful for reference, the first part giving the metric equivalents of English measures and weights, and the second part giving the English equivalents of the metric weights and measures:

1 yard	=	0.91438347 of a metre.
1 foot	=	0.30479449 " "
1 inch	=	0.02539954 " "
1 mile	=	1.6093149072 " kilometre.
1 square foot	=	0.09304 " square metre.
1 acre	=	40.46711 ares.
1 acre	=	0.4046711 of a hectare.
1 square mile	=	2.59405 square kilometres.
1 cubic foot	=	28.318019 cubic decimetres.
1 cubic foot	=	0.028318019 cubic metre.
1 grain	=	0.06479895 of a gramme.
1 pound, avoirdupois,	=	0.4535926525 of a kilogramme.
1 gallon, imperial,	=	4.54368 litres.
1 bushel, Winchester,	=	0.35243 hectolitre.
1 metre	=	39.3707904 inches.
1 metre	=	1.09363307 yards.
1 kilometre	=	0.621383 mile.
1 kilometre	=	198.84256 rods.
1 square metre	=	10.74702 square feet.
1 square kilometre	=	0.385496 square mile.
1 are	=	39.53824 square rods.
1 hectare	=	2.47114 acres.
1 gramme	=	15.43234874 grains.
1 kilogramme	=	2.20462125 pounds avoirdupois.
1 litre	=	0.220096 gallon, imperial.
1 litre	=	0.2641863 gallon, wine measure.
1 litre	=	61.027053 cubic inches.
1 hectolitre	=	2.8374033 bushels.
1 hectolitre	=	0.82494 barrels, wine measure.
1 hectolitre	=	22.0096 gallons, imperial.
1 hectolitre	=	26.41863 gallons, wine measure.

In using these tables for ordinary calculations, one or two decimals will suffice to give the approximate result. When more exactness is required, all the decimals will of course be needed. For instance, an item of agricultural news from France may be published stating that a farmer, by good cultivation, obtained a yield of 40 hectolitres of wheat per hectare. By referring to the table, we find that a hectolitre is 2.8 bushels, (and a little more), and that a hectare is nearly 2½ acres. It is easy therefore to find from this that the crop was about 45 bushels per acre. One hectolitre of seed sowed on a hectare of ground is a little over a bushel and four quarts of seed per acre. Five kilogrammes of sugar is a little over eleven pounds. A firkin of 100 pounds of butter contains 45⅓ kilogrammes. A bushel of wheat is a little over 27 kilogrammes in weight. A little practice soon fixes in the mind the comparative values of these weights and measures.

A MODEL DAIRY BARN.

By W. I. Chamberlain, Summit County, Ohio.

IT SEEMS LIKE PRESUMPTION to claim to present a model dairy barn after the many excellent plans that have appeared in the COUNTRY GENTLEMAN from time to time, and in the pages of the ANNUAL REGISTER OF RURAL AFFAIRS for twenty-five years past I simply hope to offer plans that shall meet the wants of good dairy and mixed farmers on

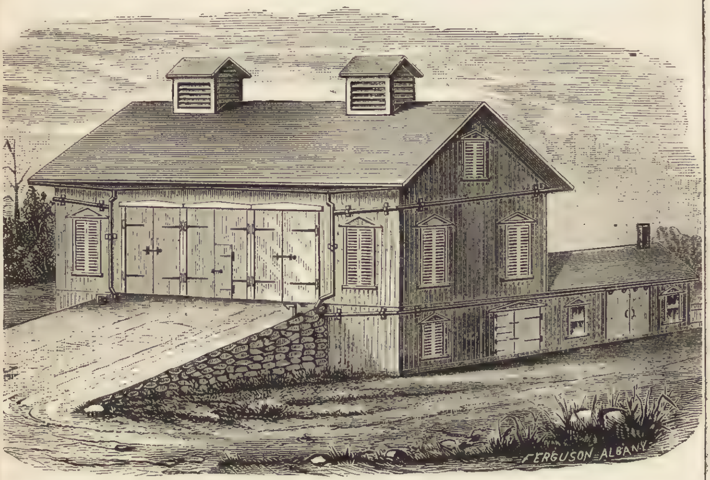

Fig. 239.—*Mr. Chamberlain's Model Dairy Barn.*

the Western Reserve, better than any I have yet seen. The barn combines the best features of many excellent ones that I have seen in different parts of the country, with several features that I have never seen in any except my own, and that have proved exceedingly valuable on thorough trial. The plan herewith presented is not, however, exactly that of my own barn. That was built of four old ones which cursed the farm when I bought it, and which I now wish I had given away or burned. Under the high prices then they saved me some $300 in timber and lumber, but gave me a barn that will never be fully satisfactory. The plan herewith presented, is as I should build now, from new material, and essentially as I did build, trammeled as I was. The points I claim are:

1. Economy of space; no waste room.
2. Economy of manure; no waste of liquids.
3. Economy of money; no useless expense.
4. Economy of feed, by keeping stock and drinking water warm.

5. Economy of labor in storing and feeding, by always taking advantage of the force of gravitation.

6. Economy of labor also, by putting everything under one roof; stock,

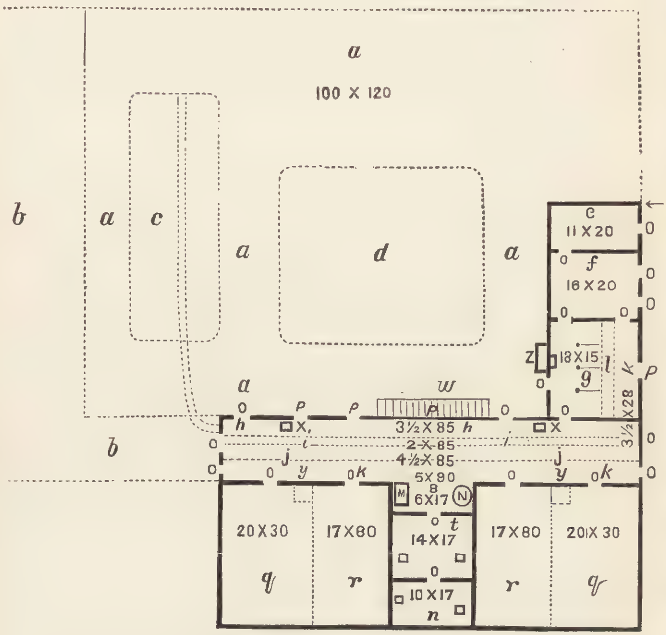

Fig. 240.—*Plan of Basement, Wing and Barnyard*—a a a, *Barnyard, surrounded by high tight fence;* b b, *Lane to Pasture, &c.;* c, *Manure Pile, with elevated track for manure truck;* d, *Straw Stack if needed;* e, *Shop and Tool Room, with chimney and coal stove;* f, *Carriage Room;* g, *Stable for four horses;* h h, *Walk behind the cows;* i i, *Water-tight Manure Gutter behind cows;* j j, *Row of Cows, stanchioned;* k k k, *Feed Passage and Walk;* l, *Horse Mangers for hay and grain or cut Feed;* M, *Water-tight Box on four wheels, for carrying water or cut feed;* N, *Tank supplied from cistern in bank by underground iron pipes and regulator;* o o o, *Doors;* p p p, *Windows,* q q, *Hay Bays from roof to basement;* r r, *same with movable barn floor for each;* s, *Space for water tank and mixing trench;* t, *Meal Room or Granary, with trap-doors from barn-floor;* w, *Covered Stairway for horses, from barn floor to horse or cow stables;* x x, *Landing from straw shoots above;* y y, *Landing from hay shoots above;* z, *Water Tank, fed from cistern, for horses, aud for cattle in yard in summer;* n, *Root Cellar or Meal Room.*

feed, absorbents, water, implements, repair shop—all conveniently accessible to each other.

I can best describe the barn and what I deem its excellencies, and the best mode of using it, by following these points, constantly referring to the engravings, figs 239, 240, 241 and 242.

1. Economy of Space.—The main barn is 45 by 90 feet, with posts

18 feet, besides 9 feet basement, and contains stabling for 30 cows, and storage for 135 tons of hay, 12 tons of straw (allowing double the bulk of hay), and 12 tons of bran or 24 tons of meal, and leaves the middle barn floor, 17 by 45 feet, and 10 feet high, for horse power and feed and straw cutter, if desired, and for storage of wagons, machines, &c. The wing or L is 20 by 45 feet, one story high, and gives room for 4 horses, 5 or 6 wagons and buggies, implements, &c., and a good repair shop and tool room, The *storage* is as follows: Hay occupies the north two-thirds of the main barn (see fig. 241, *a a*, and fig. 240), from ground to roof, and the whole length except the middle (permanent) barn floor, beneath which are meal rooms, &c., (see fig. 240, *m, n, t, u,*) and above the south two-thirds of which is a scaffold resting on the second girt, (fig. 241, *h h.*) This scaffold is laid after the threshing is done, and from the timber, &c., before used as temporary barn floor. It is used to store "rowen" hay. The cow stable occupies one-third of the basement, the whole length of the south side, (fig. 241, *b*, and fig. 240, *h, i, j, k.*) Above this (fig. 242, *a, b, c, d, e*), straw is stored *to the roof*, as hereafter described, directly from the machine, with ready access by shoots (fig. 241, *o o*, and fig. 240, *x x*, and *y y*), either to feed passage or to manure space. Thus oat straw and bright wheat straw mixed with young timothy, can be used as feed first, and the refuse for bedding; while straw that is useless, except for bedding, need never go to the manger at all. When stock, feed, bedding, machines, implements, &c., are all housed, no waste room is found from basement to roof. This seems to justify the first claim—economy of space.

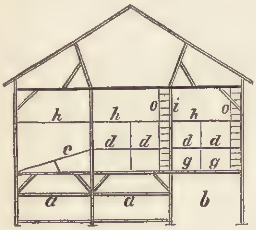

Fig. 241.—*Cross Section of Bent and Shoots between Movable Barn Floors and Bay; also same, except Shoots, between Movable and Permanent Barn Floor*—a a, *Deep Hay Bays, from ground to roof, entire length of barn (except middle barn floor) and two-thirds of the width of barn;* b, *Stable for Thirty Cows, whole length of Barn, and one-third the width;* c, *Joist or Girt for inclined movable barn floor;* d d, *Joist or Girt for elevated movable barn floor;* g g, *Permanent Floor over cow stable;* h h, *Second Girt, for scaffold after threshing time;* o o, *Shoots for hay and straw.*

2. Economy of Manure.—The straw for bedding and absorbent is always at hand, and *always dry.* It may be chaffed in the cutting box, if desired, and passed down through the south trap door, (fig. 242, *o.*) It makes better absorbent when chaffed, and handles better in the manure. This all favors the second point—economy of manure. Where there is no straw, the urine is not saved, and where straw is in the stack, often wet, snowy or frozen, it is not half so likely to be profitably worked into manure, saving all the urine. Sawdust may be used with or instead of straw.

3. Economy of Money.—Much of the usual expensive stone masonry is dispensed with Often the entire basement—all four sides—is made of quarried, and even hewn, stone. Here timber and lumber are used, except 51 feet of wall beneath the barn floor doors. Again, *all heavy timber is dispensed with.* The hay rests on *solid ground, i. e.*, on a light floor resting on the solid ground. The hay supports the barn, not the barn the hay. When it is full from ground to roof the barn can neither

settle, sag, nor blow away. The typical Dutch barn of Central Ohio and parts of Pennsylvania stores a hundred tons or more of hay and grain on the main floor above the basement. This floor rests on huge, long sleepers 8 by 10 inches in size, 2 or 3 feet apart, and running from front to rear, and projecting 10 or 15 feet beyond the rear basement wall for an "overshot." This "overshot" occupies (or wastes) the entire room of the cow stable in fig, 239, and has always seemed to me a sheer waste. That form of construction, too, requires heavy stone-work in the basement, and for a barn the size of fig. 239 requires some thirty huge sleepers (besides the cross-sills and posts) 45 feet long, 8 by 10 inches in size, and requiring nearly 9,000 feet board measure, of timber, —most expensive, from its great length. Also 8,000 feet of plank flooring to cover it. The barn (fig. 239) saves all this huge timber and most of the flooring by letting the hay *extend to the ground.* It also saves the entire space of the cow stable, by simply enclosing it on the south. It requires no heavy timber anywhere. The basement has no sills (except those overhead), only posts and girts and braces The posts rest on a single course of quarried stone, or on a single stone for each post, and these on cobbles laid below the frost. Below these a good 3-inch tile drain is laid beneath the entire foundation of the barn, and having a good outlet. This keeps the basement dry, and protects the hay from becoming musty. The bottom girt (fig. 241), is 4 inches above the stone, and will not rot as a sill might resting on sandstone so near the ground. The sills are *above* the basement, 9 feet "in the clear" above ground, and are the only heavy timber required in the barn, except the basement posts. These are 8 by 8 inches. For the other posts, and the plates, 6 by 6 inches, or 6 by 8 inches, is sufficient in a barn that *sustains no weight* except 12 tons of straw above the cow stable, and a few tons of "aftermath" above the middle barn floor. Above the cow stable, no heavy timber is required, as the row of stanchion posts supports the scantling near the middle. Two by six-inch scantling is sufficient. The barn, then, saves money by dispensing with heavy timber and flooring, and heavy masonry.

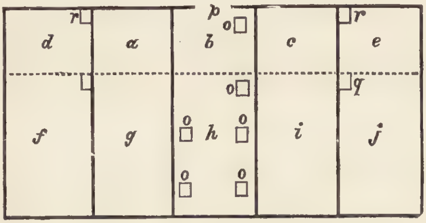

Fig. 242.—*Main Part of Barn above Basement*—a b c d *and* e, *Permanent Floor above cow stable, filled to roof with straw at threshing time ;* f j, *Deep Bays, permanent ;* g i, *Deep Bays after temporary elevated floor is removed ;* h, *Permanent Barn Floor ;* o o o o, *Trap Doors to granary and meal room, and cut feed mixing box and manure gutter or root cellar ;* p, *Door to straw stack and to stairway for horses* (*see fig.* 240) *;* q q, *Hay Shoots ;* r r, *Straw Shoots.*

4. It also secures economy of feed by keeping the stock and their drinking water *warm.* The stable is on the *south side ;* is protected above and on the north by 150 tons of hay and straw, by the earth bank, and on the south, east and west, if necessary, by double siding and by double doors and windows. The water in the tanks (*N* and *z*, fig. 240, the tanks having lids), will not freeze in a barn so built, nor will the manure in the gutter or drop. The cattle never shiver, and do not devour hay like those

in a cold barn, or around a colder stack, and drinking freezing water through a hole in the ice.

5. Economy of Time and Labor.—First in storing the feed. Suppose tne barn empty at the beginning of haying. We open the *west upper* double doors. Here we find a movable or *temporary elevated* barn floor. It is in three sections of 15 by 17 feet; the planks 17 feet long 1 foot wide, running crosswise, the joists, 2 by 6 inches and 15 feet long, running lengthwise of the barn floor. Two movable cross sills sustain the middle bent of joists and the *middle ends* of the end bents. The north ends of the north bent rest in the gains cut in the south side of the north sill. The south ends of the south bent rest on a heavy cross girt. The floor, when in position, elevated, slopes up the girt *c*, fig. 241, and runs along the girts, *d d*, 5 feet above the sills and 15 feet above the ground. Up this slope and along this elevated floor we drive our load of hay, the hay rack being even with the second girt, and the top of the load reaching above the big beam, or 27 feet above the bottom of the west bay (*q*, fig. 240) where the hay is to land. No horse fork is needed, and scarcely a man to mow the hay for the first few loads. A lively hand will throw off the load by hand quicker than two men can unhitch the team and do it with a horse-fork. Before an oncoming thunder storm I one day left the men cocking hay in the field, drove a large load 30 rods to the barn, pitched it into the deep bay, mowed it pretty well in throwing it off, and was back to the field in *eleven minutes*. This is not the ordinary rate, indeed, but time after time—yes, all the time—these huge, deep bays, prove themselves the greatest possible saving of time and labor in storing the hay. The force of gravitation works with and not against you. A team can draw a ton of hay 15 feet up a slop far easier than a man can pitch it 15 feet straight up on a fork, and far easier than a team can haul it up with pulleys and a horse-fork. And the barn will store a hundred tons of hay *below the top of a load* standing on the elevated floor. The hay, too, descends so far that a slight impulse will send a forkful to the back side of the bay.

When the west bay is filled to the roof the floor is moved to the space to which the east doors lead, and the east bay (*q*, fig. 240) is filled to the roof. Then the elevated floor is removed and placed *above the permanent middle floor*, and the bays (*r r*, fig. 240,) are filled with hay from the ground up to the level of the permanent floor, then with grain ready for threshing, to the roof if necessary.

At threshing time the movable barn floor is put to a new use. It is in three sections exactly equal, 15 by 17 feet. Each joist is like all the rest, and all the planks are alike, and timbers and planks are so fitted that they can be placed in *any three* of the *nine equal spaces* (15 by 17) that make up the three barn floors. They are now placed on the spaces *a*, *b* and *c*, fig. 242, 10 feet above the floor over the cow stable, resting on the second girt, *h*, fig. 241. They serve as a high scaffold to catch the straw from the machine, and make it easy to store it clear to the roof in spaces *d* and *e*, (fig. 242,) or if desired, in the bay *g* or *i*, (fig. 242,) as soon as the grain is threshed. When these spaces are filled the temporary floor is removed from *c* and *a*, and these spaces filled from the scaffold still remaining on space *b*. The grain is poured through the trap-doors *o o*, (fig. 242,) into the granaries below.

After threshing, the movable floor may be used again as an elevated one over the permanent floor *h*, (fig. 242,) till the bays, *g* and *i*, are filled to the roof with "rowen," or Hungarian hay, or stalks, or fodder corn.

Finally it may be lifted to the second girt (*h h*, fig. 241) and filled with "rowen" hay, and remain there all winter, leaving the barn floor clear for storage of machines and wagons, and the working of the cutting box. Grain for sale is loaded on wagons standing in the cow stable. Shorts and meal are dumped into the meal-rooms through the trap-doors, *o o*, in the permanent floor (fig. 242). A car load or more can be stored in summer while shorts are low.

The barn saves labor, too, in the care of the stock. Hay and straw are right above, and come down by their own weight when started. Meal and shorts are in front of the cows, next to an unfailing supply of water in the tank *N*, (fig. 240.) This tank, as well as the horse stable tank, *z*, (fig. 240,) is fed from the bank cistern, and is kept always full by a simple and cheap device. Shorts, meal or cut feed may be mixed in the box or movable tank, *M*, (fig. 240,) rolled along the passage, *k k*, (fig. 240,) and shoveled into cows' feed boxes or horses' mangers. Water may be drawn along in this movable tank, *M*, in front of the cows, so that three at a time can drink from it.

In some barns I have seen at the East each cow has an iron sink to drink from, all the sinks being joined by an iron pipe, and fed from a faucet. This makes the watering easier, but the expense, and the surplus water left in the sinks, are two out of several objections against introducing them into an ordinary dairy barn. Indeed, in my barn, the cows are watered in their feed tubs, the water being dropped from the tank, *N*, (fig. 240,) with a six-gallon pail. Thirty cows can be watered thus in far less than in as many minutes. In mild weather they go to the field for water.

The horse stable is adjacent, *g*, (fig. 240,) nnd the horse manure is mixed in the gutter behind the cows. It absorbs urine, helps the cow manure heat a little, and keeps the horse manure from burning in the heap. Instead of taking the manure to the pile *c* (fig. 240) with hand truck or wheelbarrow, a team with sled or wagon may be driven the whole length of the stable when the cows are out, and the manure drawn directly to the field in winter, and put in compact piles of 500 pounds each or so, to be spread and plowed under in spring. I have practiced this method myself with great satisfaction. It saves once loading and unloading the manure, helps forward the spring work, and the unrotted straw and manure have excellent mechanical effect on a stiff clay soil, when plowed under.

6. Labor is saved, too, by putting all animals, feed, bedding, implements, tools and repair shop *beneath a single roof.* No one knows how great a help this is, unless he has tried both ways. Every day, now, I wonder how I ever formerly *lived in four barns!*

The points I deem most original and most valuable are:

1. The very deep bays running to the ground.
2. The temporary barn floor giving ready access to the end bays, and itself leaving a deep bay when it is removed.
3. The *elevated* floors, making so much more down hill pitching.
4. The great amount of storage secured in proportion to the roof.
5. The bank cistern and self-feeding water tank.
6. The position of meal rooms, securing ease of storage.
7. The mode of constructing water-tight stable floor and gutter.

THE

ILLUSTRATED ANNUAL REGISTER

OF

RURAL AFFAIRS.

SURROUNDINGS OF SCHOOL-HOUSES.

THE MOST DURABLE impressions on the mind are those made in early life. Such impressions should be of an instructive and pleasing character. They should bring out and strengthen a taste for order, neatness and excellence. Special attention should therefore be given to make the country school-room and its surroundings—a place where half the waking hours of childhood are spent—in every way tending to stamp the right kind of character on the young mind.

There is nothing in all the departments of rural improvement where a greater deficiency exists. In many parts of the country the common school-houses are greatly neglected. In riding through so prosperous a region of country as one of the best counties in Western New-York, a cheap district school-house was seen unpainted and in a dilapidated condition, its original cost not amounting to $500, and unshaded by a single tree. It was partly crowded into the public road, as not a quarter of an

acre could be spared for a school lot from the contiguous two hundred acre farm. Within view, and not more than a mile distant, were two magnificent brick barns, belonging to the two neighboring farmers, and neither

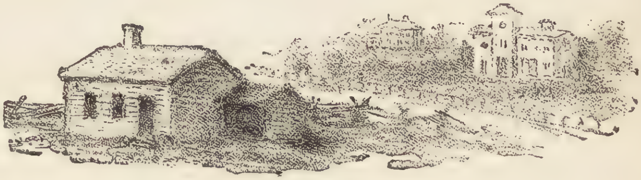

Fig. 244.

of these buildings could have cost less than $6,000, (fig. 244.) This contrast between the small, poor and bleak school-house and the elegant and spacious barns, indicated the relative estimate which the intelligent landowners of this region placed on their horses and their children.

Children should not be driven from school by the repulsive appearance of the surroundings. Their early days and early impressions should be connected with the cultivation of landscape taste, which would not only tend to draw them away from the demoralizing influences of street lounging and drinking saloons, but they would brighten the mind, stimulate the intellect, encourage study, and fit the future men and women all the better for the active duties of life. They would increase the attractions of rural life and of home influences.

The writer had an opportunity some years ago for trying an experiment in favor of school-house adornment, in a region of country where

Fig. 245.

these buildings were much neglected. He was applied to to sell a three-quarter acre lot for the new school-house. The condition in the sale was insisted on, that the trustees should plant and keep in thrifty con-

dition at least a dozen deciduous shade trees, and as many evergreens, or forfeit annually a specified sum. They paid the penalty the first year, and then concluded that it was cheaper to plant and take care of the trees. That school-house is now the only one in that region of country that enjoys anything like landscape adornment, (fig. 245.)

The character of the planting must vary with the character of the people. If they have little horticultural taste, they must not attempt too much. The school-house lot should, however, contain an acre at least, and the building may be simply flanked with scattered trees and groups. The ground should be seeded to grass, which should be cut with one of the cheap and efficient hand lawn-mowers as often as once a week in summer. This will afford a handsome green carpet for the children to tread on, the play ground occupying the rear, so that the green in front may not be worn brown by their active feet. A gravel walk may extend to the house in front, provided it can be kept neatly trimmed at the borders, and in perfect order (fig. 246); but if this neatness cannot be preserved, it will be better to have no other walk than the smooth path worn by the feet. Such grounds, neatly kept, would afford a pleasing combination of shade and grass carpet, which would not be lost in its influence on the young mind.

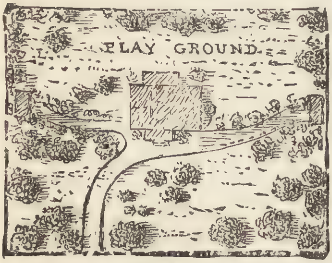

Fig. 246.

If some horticultural taste exists in the neighborhood, and if a teacher can be secured who will foster this taste in his pupils, the grounds may assume a more ornamental character. A few circular flower beds may be neatly cut in the grass, and planted with such easy growing and continued bloomers as verbenas, double zinnias, Drummond phloxes, petunias and geraniums, (fig. 243, vignette at head). These flower beds will add largely to the charms of the place. The scholars should be enlisted in taking care of them, and in preserving their neatness and finish, and they should feel that their care and skill are appreciated by older persons. This method has been tried with much success on the grounds of a higher seminary, a simple horticultural society, with president, secretary, and other officers, being formed of students and teachers, and brief lectures or lessons given on the principles of vegetable growth, aided by experiments in the germination of seeds, budding, grafting, &c. In another instance, the young teacher of a district school was successful in the cultivation of annuals about the school-house, and a profuse and brilliant display of flowers was seen through the season. The cheerful stimulus thus given to the scholars was felt in their studies, and that school was conspicuous for the progress made by them in all departments.

Academies and other institutions more advanced than common or district schools, may carry these improvements much farther. An arboretum may be planted on a portion of the grounds, consisting of all the principal timber and other trees, with which young persons should be well acquainted. Another portion may contain living specimens of all useful cultivated plants and their varieties, such as the various species of cultivated grasses, varieties of wheat, specimens of lucerne, cotton, madder, millets, &c., and an in-door collection should occupy a room for all agricultural plants and their products. Handsomely laid out grounds, with landscape effect, would infuse into the students a desire to repeat such pleasing results at their own homes.

A teacher in such an institution should know how to make botany and its applications attractive, illustrated by trees and plants in sight, or portions of living specimens on the table before him, and should be able to explain to his pupils the requisites for germination of seeds and the succesful growth of plants, for transplanting, pruning, budding and grafting, and encourage all the experiments practicable. Thus useful as well as interesting information would be imparted to them that would prove of value through their lives.

A recent writer describes the frequent condition and character of country school-houses and grounds in another State, in these words: " Buildings with the panes broken out of the windows, and a panel or two of the front door stove in, the sides cut and marked with rude and coarse representations, the fences broken down, and altogether a general appearance of riotous and destructive character," (fig. 247.) To show that this battered condition depends on the treatment which the scholars receive, and that no appeal is made to their sense of propriety and taste, it is only necessary to mention a single case, where in a large school the desks and walls were thus cut and defaced in a single winter to an amount of damage estimated at $400. A new teacher came, new furniture was procured, the buildings were repaired, and for the next five years not a pencil scratch or a knife mark was seen on one of the desks.


Fig. 247.

Trees and Shrubs.—Among the larger trees the sugar maple, black and white birches, and the silver maple, form good shade trees, and they may be placed towards the outer portions of the grounds. For more extended places, the chestnut and black walnut may be chosen. Among smaller trees the horsechestnut, the striped maple and the mountain ash are adapted to more limited grounds. For large, dense shrubs select Tartarian honeysuckle, Philadelphus, purple fringe and lilac. Large growing evergreen trees may be kept within bounds by cutting back

so as to give an irregular outline, and not by shearing back to a uniformly even and stiff surface.

The views of school-houses which we have already given represent those of small size. In larger districts, more capacious buildings may be

Fig. 248.

built, as shown in fig. 248, with a small belfry. A still larger one, with different apartments and recitation room, is shown in fig. 249, having less of the stiff and formal expression of square Grecian blocks, and more of the cheerful and home-like appearance of cottage outline.

Fig. 249.

The plan shown in fig. 246 has a handsome lawn in front, planted with the smaller ornamental trees, and with some of the larger shrubs. The play ground is in the rear, and is planted with fewer trees. It is important that both be kept smoothly shaven with a lawn mower. The labor will be small, and could be performed by some of the larger and more careful scholars. The narrow paths to the closets on each side are sheltered with small evergreen trees, both for seclusion and for protection from snow drifts in winter. The condition of such closets is a pretty certain indication of the degree of civilization of the owners and occupants. If untidy and repulsive, the people of the district may safely be set down as in a partly savage state. If neat and clean, and all bad odor and foul drainage are prevented by a daily use of coal

ashes, road dust or other suitable absorbent, we may be sure that we have reached a fully civilized community.

Another plan of school grounds is shown in fig. 250, where the house is set near one side, so as to give more room on the other part for lawn and play ground. The closet is divided, and entered on opposite sides. It may be remarked that when a daily absorbent of a few pints of road dust or coal ashes is used, there will be no more difficulty in drawing or wheeling off the contents each month or two, than in shovelling and wheeling the same quantity of sand, and there can be no danger of bad air or polluted water, to the detriment of the health of the students. See RURAL AFFAIRS, vol. VII, p. 73, for details.

Fig. 250.

When the grounds are necessarily limited, the school-house may be placed at one side, as in fig. 251, or in the middle, as in fig. 252. The former may be planted with shrubs and small trees; the latter with two or three larger trees for a shade.

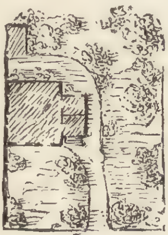

Fig. 251.

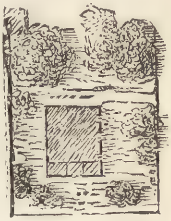

Fig. 252.

The appearance and condition of country or district school-houses have much improved in many parts of the country, but with scarcely an exception, little is done to ornament the grounds, although the cost is a mere nothing compared with the expense of the buildings. In a rich county in Central New-York, a good looking, white painted school-house is placed at the corner where two public roads meet, and a jog in the fence is all the space that can be afforded it from the wide fields of the adjoining two hundred acre farm. The single small closet is set nearly in its front in the street. Two miles farther on is another well built stone school-house, where the only play-ground for the children is the public highway, and the closets are repulsive and exposed to all passers by.

With so little expense in making school-house grounds neat and ornamental, there is no excuse whatever for their owners, for not rendering them at least as pleasant to children as their own comfortable houses. They should be more so, that they may mould and improve the young mind in all that renders the countr" attractive.

IMPROVEMENTS IN FENCES.

Barbed Wire Barriers.

THE CONSTRUCTION AND MAINTENANCE of farm fences require constant and heavy outlays. Not less than seven hundred million dollars have been expended in the entire Union for this purpose, and fifty million dollars annually are required to keep them in repair. The ingenuity of inventors has been largely employed in devising improvements for rendering them more effective, cheaper and more durable. Various modifications have been successfully used, and different hedge plants have had their periods of popularity. The old zig-zag rail fence has been long and widely employed, and will continue to be, where land is cheap and timber abundant. The post-and-rail fence is stronger, more durable, and occupies less ground; and with a bank of earth at the bottom, is still one of the best forms, (fig. 253.) The English hawthorn was largely planted for hedges many years ago in some districts, but the borer, leaf blight and rust destroyed them, and they have long since been generally discarded. Then the buckthorn had its day, but it failed for want of thorns and stiffness of growth. Twenty years ago, or more, the zig-zag board fence, without posts, was widely recommended and adopted, and a multitude of patents were granted for various modes of connecting the ends. Strong winds frequently laid them on their sides, and they have passed out of use. Of later years, honey locust and osage orange hedges have been largely planted, and when properly managed and cared for, they have made excellent barriers. But few are willing to give them sufficient attention in cultivating while young, and in keeping well cut back. The honey locust is valuable at the North on account of its hardiness, and its formidable thorns render a well made hedge impassable. Its tall growth, and its deficiency in natural "hedginess," render continued care necessary to keep it close and compact in growth. The osage orange is rendered equally formidable by its more numerous and smaller thorns, but being less hardy it is frequently winter killed, unless growing on a dry bottom or subsoil, or near a line of tile drain. With such drainage, the writer has efficient hedges of the osage orange more than thirty years old, that are likely to continue for many years to come.

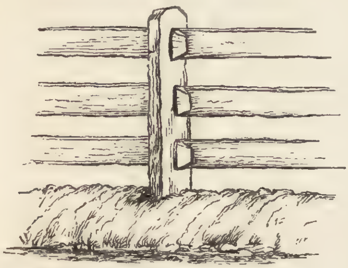

Fig. 253.

Like the honey locust, it requires constant attention to keep it within bounds.

A new era in fence-making has opened within a few years by the manufacture of the barbed wire, of which there are many modifications and a large number of manufactories. This wire is valuable for adding to the efficiency of the older fences and hedges, and the chief object of the present article is to point out how this wire may be advantageously employed.

One of the best farm fences made of wood and forming a straight line, is the one invented by E. W. Stewart, and described several years ago in the COUNTRY GENTLEMAN. Full directions for its construction, with additional improvements in setting the posts accurately and rapidly, with illustrations, were given in the eighth volume of RURAL AFFAIRS. Fig. 254 is a view of a portion of the fence, showing the manner in which the

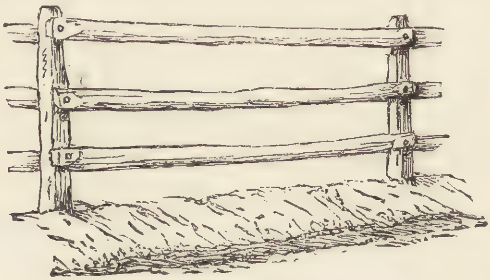

Fig. 254.

rails are secured to the posts on opposite sides, by screw bolts passing through the ends of the rails and the post. This fence, if well made, will remain without any need of repairs for a long series of years, and will last as long as the posts remain. A barbed-wire stretched along the top, or instead of the top rail, will prevent animals from attempting to pass it. Plowing and banking at the bottom obviates the necessity of a bottom rail, assists in drainage, and prevents horses from leaning against it. A serious objection to the adoption of this fence by farmers, is the difficulty of procuring the long screw bolts which are required for its construction.

The common post-and-board fence forms a good farm barrier, and has been extensively used in the country. As commonly made, it is not strong enough to resist bulls and unruly horses, which frequently tear off the upper boards. Additional strength is given by nailing a stout top board on each side of the post, and surmounting both with a strong cap-board on the top of the sawed ends of the posts, as shown in the cross-section by fig. 255. But a much simpler, cheaper and more efficient protection

is to stretch a single line of barbed wire along the top of the fence. It may rest on the top board, or run along the tips of the posts, as in fig. 257, or the top board may be omitted and the barbed wire take its place,


Fig. 255.

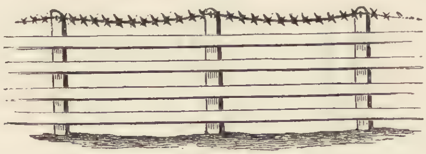
Fig. 256.

as in fig. 256. Strong board fences, which had been repeatedly torn asunder by a herd of unusually lawless horses belonging to a neighbor, were rendered perfectly impassable to them for years afterwards by the simple and cheap remedy of a single barbed wire on the top. Even a weak fence is thus made practically strong.

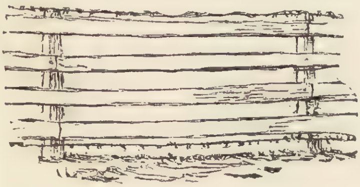
Fig. 257.

It is only in neighborhoods where civilization has made but partial progress that swine are permitted to run in the streets, and where tight fences below are required. In such cases a single wire just below the bottom board, as shown in fig. 257, will be sufficient to exclude them, and such a fence will answer a good purpose for the boundaries of small hog pastures.

Many serious accidents to horses, and occasionally to other animals, have occurred where barbed wires have been wholly employed in the construction of fences. Being nearly invisible, animals have heedlessly dashed against them and become badly lacerated, and the damage has been greatly increased when they have been caught between, or been entangled in the wires. Some additional and more visible barrier should therefore always accompany the wires. In regions where small stones are common, a ridge of these placed along under the wires and between the posts, will answer a good purpose.


Fig. 258.

The adjacent fields will be improved by the removal of these stones. This line of stones need not be a regularly built wall, but they may be

placed loosely, evenly and regularly, as shown in fig. 258. Fig. 259 is a cross section. Animals dislike setting their feet on them. As the wind obtains no purchase on such a fence, and as little pressure is ever exerted against it, the posts need not be deeply set, the stones about them affording additional support. This line of stones may be two feet high and three or four feet wide.

Fig. 259.

Where stones do not exist, a cheap substitute is a bank of earth. A few furrows are plowed on each side, and the earth thrown up into a smooth embankment, about two feet above the bottoms of the ditches on each side, fig. 260. Such a fence as this, with two barbed wires for cattle and horses, or three for sheep, is one of the cheapest and most durable that can be constructed. The posts need not be heavy: they may be placed at least a rod apart; they may be cheaply set, as deep holes are not required; the embanking is done readily with the plow; and lastly, the wires are stretched rapidly on the posts. The bank becomes sodded with grass, and, together with the ditch, will prevent animals from blindly striking the barbs. This fence is likely to become widely adopted for sub-divisions of farms.

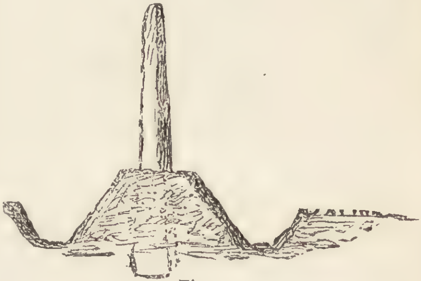

Fig. 260.

The cheapest form of the barbed fence is where a line of trees may be used for supporting the wires, as shown in fig. 261. A line of maple or other shade or timber trees will answer the purpose, and the fence may be

Fig. 261.

completed (with the ridge or bank of earth) when they are two or three

inches in diameter. An end view of the line of trees and cross-section of the bank is shown in fig. 262.

The cost of such fences may be readily estimated by counting one post to every rod, and 50 cents a rod for the three barbed wires. The labor of construction may be reckoned at about 20 cents a rod, making the whole expense less than $1, or about 80 cents for two wires. An important item of saving is in avoiding all necessity for repairs for many years. The cost will vary with the price of posts, and with the ease or difficulty of forming the embankment of soil.


Fig. 262.

In all barbed wire fences the wires should not extend for a distance of more than 20 or 25 rods, that the expansion by heat and contraction by cold may not be too great—the ends being secured to stout posts set at these distances apart. Galvanized wire is better and more durable than wire covered with paint.

Hedges and their Management.

Hedges possess strong advantages and formidable objections. The most impregnable, as the honey locust and osage orange, are difficult to keep in shape on account of their rapid growth and repulsive thorns. Those of a more inoffensive character are easily trimmed and cut back, like the buckthorn and privet among deciduous hedge plants, and all among evergreens; but they do not alone constitute a sufficient defense. Evergreen hedges are much admired on account of keeping green through the entire year. Perfect barriers may be made of them by enclosing barbed wires along their whole length. These wires are placed in position by stretching along the line on light, temporary posts, in successive years, so that the growth of the hedge may enclose them and hold them among its numerous branches where they cannot become displaced. When the plants are about twenty inches high, stretch the first wire, just resting on their tips or upper forks. The hedge soon grows and encloses it. Additional wires, as may be needed, are placed in position in successive years. Two wires will be quite enough in most cases. One alone would exclude nearly all intruders. Three might be needed for enclosing fruit gardens. These wires, when once covered, cannot be bent or thrust aside; they are stiffly held by innumerable branches. Such a fence has not the objection of being invisible to animals. Norway spruce is the strongest growing evergreen; hemlock and arbor vitæ may be made efficient by the enclosed barbs. Among deciduous plants the buckthorn would doubtless prove the best, as it is easily raised from seed, is transplanted with great facility, is perfectly hardy, has a natural hedginess, and, except on rich ground, has a very moderate growth. The wire used for these purposes should be galvanized, and not painted, as it is to remain many years.

Fig. 263 shows how such an evergreen hedge is started. The young plants of Norway spruce are placed about two feet apart. The distances might be greater if longer time could be allowed for the branches to meet and fill the spaces between. If placed two feet apart, and the line of the

Fig. 263.

hedge is kept properly cultivated, the spaces would be well filled in three or four years; if three feet apart, five or six years might be required. The dotted line at the top shows the place of the third wire when the evergreens reach it, if a third one is required. It may not be necessary to cut back evergreens like deciduous plants, but if the Norways, after they are fairly started, are pinched back early in summer, so that no side shoots shall be over six inches long, and no leaders more than a foot, the hedge will be more compact and beautiful.

A hedge should never be *sheared*, so as to form a smooth wall of ver dure. It should be cut back by taking off every longer shoot at a fork, leaving no stump. This work may be performed rapidly after some practice, either with a knife or with shears. When the exterior is smoothly sheared, a close, dense stratum of foliage is formed, shutting out the light from the interior, which in a few years becomes a mass of bare branches. Fig. 264 represents a portion of such a hedge, with a cross-section at the nearer end, showing the interior entirely destitute of foliage. Such a hedge, usually left broad at the top, causes the lower branches gradually to die, and the whole hedge perishes sooner than if properly pruned. If simply cut back with a knife, or with shears, leaving an irregular surface, as in fig. 265, the interior foliage will be fresh and dense for a long time (as shown by the cross-section at the nearer end,) and the hedge itself will live longer.

Fig. 264.

Fig. 265.

Fig. 266 represents a screen, the trees planted 8 or 10 feet apart, and bearing two wires. Such a screen will answer well for some of the subdivisions of the farm, and for the windward boundaries of barnyards. Norway spruce trees, if planted eight feet apart, will meet and form a continuous screen in eight or ten years.

Fig. 266.

The cost of evergreen hedges, and of screens, may be readily ascertained by procuring from nurserymen their wholesale prices, and calculating the length of line reached by a thousand. If $2\frac{1}{2}$ feet apart, a thousand will extend about half a mile. The prices vary much in different seasons, and with different dealers, according to the supply or surplus on hand. In some years, when nurseries were overstocked, trees a foot and a half high could be purchased for thirty or forty dollars a thousand, or even less, but more commonly the price is double or triple this sum. Smaller trees may be had at lower rates.

It is not probable that hedges of any kind will ever be generally adopted as farm barriers; the labor of keeping them cut back will deter farmers generally from planting them extensively, but they will answer well for enclosing fruit gardens, and the taller screens will be valuable for cattle yards. The fences represented by figs. 254, 258 or 261, or some of their modifications, promise to become more extensively useful.

Early Peaches in England.—The Garden states that the Amsden and Alexander peaches were ripened in fruit houses by Mr Bond, in Shropshire, on the 24th of April, 1880. They were started, with gentle heat, about December 20th, giving four months for the completion of their growth and maturity. They are pronounced very promising for forcing.

THE NEWER STRAWBERRIES.

WITH NO KIND OF FRUIT can new varieties be so easily and rapidly produced as with the strawberry. The pistillate sorts must be fertilized with a staminate to make them productive, and every seed therefore from this cross-fertilization is capable of originating a new plant. Multitudes of new sorts are thus constantly brought into existence, a few of which, perhaps one in ten thousand or in half a million, may be worthy of propagation. The history of the changes which have been made in approved lists, in each ten years, if fully given, would show fluctuations not to be found with any other fruit.

Forty years ago few cultivators heard of any sorts but the Duke of Kent, Large Early Scarlet, Methven and Hovey's Seedling—the latter a great acquisition, and continuing the most popular variety for many years. Ross' Phœnix soon followed, was highly praised, and was soon forgotten. Some English varieties, as British Queen, Deptford Pine, Elton and Swainstone, were tried to a limited extent, but did not meet the public demand. Years afterwards Burr's New Pine stood at the head of the list for excellence, equalled at a later period by Hooker. Peabody's Seedling would have had a longer run if more than one good berry could have always been found on a square yard of space. Longworth's Prolific and McAvoy's Superior held a high position at the West. Many new sorts arose and fell into oblivion, although possessing special merits, among which were Walker's Seedling, Boston Pine, Black Prince, Cushing, Agriculturist, Crimson Cone, and others; but through a period of nearly a quarter of a century, and after all these have been discarded, the Wilson has been cultivated throughout the Union in greater numbers than all others put together. Many new sorts have been introduced as likely to supersede it, some of which are among the past, while the Wilson is still largely grown. Among the most successful is doubtless the Charles Downing, the reputation of which has become widely established. The Triomphe de Gand, for special culture and on strong soils, has held its position as long as the Wilson.

As an indication of the most popular sorts in 1858, twenty-three years ago, the following list of the ten best amateur sorts, and the ten best for market, which received the highest votes at the summer meeting of the Fruit-Growers' Society of Western New-York, are named in the order of their approval:

FOR AMATEURS.—Hooker, Burr's New Pine, Large Early Scarlet, Hovey's Seedling, Wilson's Albany, Jenny Lind, McAvoy's Superior, Triomphe de Gand, Peabody and Trollop's Victoria.

FOR MARKET.—Large Early Scarlet, Wilson's Albany, Crimson Cone, Genesee, Hovey's Seedling, Hooker, Cushing, Scott's Seedling, Longworth's Prolific and Iowa.

More recently great attention has been given to originating and to the careful selection of new sorts, and notices therefore of those which have attracted wide public attention, may be acceptable to inquirers.

Notes on the Varieties.

In the following list the varieties are arranged nearly in the order of their ripening, the earliest being placed first. There may be a few exceptions to this order, variations resulting from climate and seasons. The figures are of medium sized, not large berries.

Fig. 267.—*Duncan.*

Crystal City.—This variety, during the few years it has been in cultivation, has obtained a wide approval both at the East and West for its earliness and good quality. It is medium in size, conical; in color rich scarlet, and sweet in flavor, like Triomphe de Gand; ripens several days before the Wilson; plant vigorous and productive. Too soft for distant market.

Fig. 268.—*Duchesse.*

Duncan (fig. 267.)—For good size and excellent quality the Duncan stands nearly alone among the early sorts, if it receives good culture. It is rather large in size, roundish oval, large ones slightly coxcombed; flesh moderately firm; flavor excellent. It originated in Ulster county, N. Y., with J. G. Lucas, who made of it a profitable market sort. It requires a strong, rich soil.

DUCHESSE (fig. 268.)—Full medium in size; bright scarlet; flesh rather firm, of fine flavor. E. P. Roe of Cornwall, says of it: "Enormously productive, from 50 to 200 berries to a plant, in hill culture. I regard it as the best early standard berry." In other localities it has not succeeded so well, and by some it is discarded.

PIONEER.—One of Durand's new sorts. Large, very good, scarlet. Roe says: "The foliage dies during winter, but the root sends up new strong growth." It is vigorous and productive, but the foliage burns on light soils.

CRESCENT (fig. 269.)—Large, conical, slightly depressed at the apex, rather soft, bright scarlet, somewhat acid, and with a quite moderate flavor; variable in quality; plant remarkable for its hardiness and vigor,

Fig. 269.—*Crescent.*

and for its enormous productiveness, which will render it popular, notwithstanding its second-rate flavor. Its free growth without care has induced many to neglect its culture and to become disappointed from its smaller size. Raised by Wm. Parmlee, New-Haven, Conn.

CINDERELLA.—A handsome early berry, rather large in size, conical, regular and uniform; bright glossy scarlet; moderately firm, with a good aromatic flavor. It requires hill culture and cutting of the runners; moderately productive; desirable for the garden.

BIDWELL.—Berry conical, light scarlet, glossy and very early; new. E. B. Underhill of Poughkeepsie, N. Y., says: "If not lacking in foliage, it will rival the Sharpless." Originated at South Haven, Mich.

PROUTY'S SEEDLING.—Large, long conical, bright scarlet, glossy; flesh moderately firm, and of fair quality; vigorous and very productive; feebly staminate; requires rich soil.

CAPTAIN JACK (fig. 270.)—Berries medium, regular conical, bright

Fig. 270.—*Captain Jack.*

Fig. 271.—*Forest Rose.*

Fig. 272.—*Monarch.*

scarlet, rather acid, not high flavored. Its extreme productiveness renders it popular in many localities, especially in Missouri and at the West; while on the other hand it is discarded by many. The plants are very hardy, and the leaves come out after winter with a deep green color. Raised by S. Miller, Missouri.

FOREST ROSE (fig. 271.)—Medium or rather large, oval, nearly regular, rarely coxcombed; color fine scarlet, rather acid, often quite productive, but more frequently a moderate or poor bearer; stamens often nearly obsolete.

MONARCH OF THE WEST (fig. 272.)—Large, light scarlet, ovate, a little flattened, and with a distinct furrow down on both sides, nearly

regular; good, but not high flavored. Succeeds in most localities East and West, but is only a moderate bearer.

GREAT AMERICAN.—With the highest culture this is a very large and good berry, but with neglect it entirely fails. Charles A. Green writes: "The Great American is very large, of good quality, deep, bright red; round and regular in form, and moderately productive. Its place is in the garden of the enthusiast—it has not vigor for ordinary field culture, it is best on strong soils."

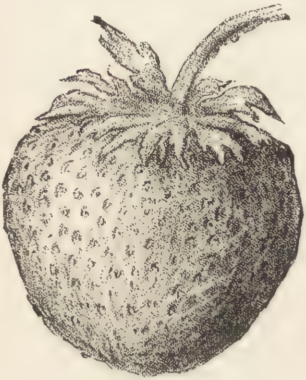

Fig. 273.—*Cumberland.*

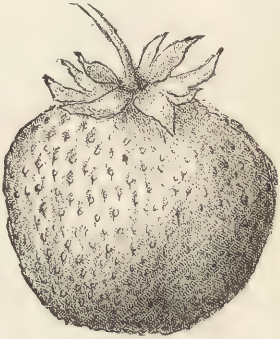

Fig. 274.—*Seth Boyden.*

CUMBERLAND, (or Cumberland Triumph,) (fig. 273.)—Very large, roundish conical; unusually uniform and regular in form for so large a fruit; calyx large and partly lobed; stamens not largely developed, and in some localities it is benefited by a staminate fertilizer. The large size of this strawberry, its productiveness and good quality render it valuable for home use; it is too soft for distant market. E. B. Underhill of Poughkeepsie, N.Y., says: "It produces more quarts, and always outsells the Wilson." Raised by Amos Miller of Pennsylvania.

Fig. 275.—*Black Defiance.*

BOYDEN, (or Boyden's 30, or Seth Boyden,) (fig. 274.)—Large, sweet;

has proved valuable for market in some localities, and a poor bearer in others. It requires high culture and cut runners.

Black Defiance (fig. 275.)—Medium or large, roundish conical, dark crimson, firm, high flavored; for the garden.

Cowing's Seedling.—On light soils large, bright color, high quality; moderately firm. On strong, heavy soils it becomes overgrown and mis-shapen.

Sharpless (fig. 276.)—This well-known new sort has reached a very high reputation during the few years since its introduction, but the vote has not been unanimous in its favor. In some localities it has not borne

Fig. 276.—*Sharpless.*

well, nor been of high quality. E. B. Underhill says: "It has not driven the Monarch, Cumberland or Boyden from the field as large sorts." C. A. Green writes: "It has more than met my expectations. Its great fault is its lack of lustre. I dare stump the world to produce a superior. The largest berries only are inclined to be irregular. It is second-rate if over-ripe. It will never be popular for distant shipment." Roe says "it is carpet-bag in shape." Its chief value will be for home and near markets. It ripens a little before or about the same time as the old and well-known Kentucky.

President Lincoln (fig. 277.)—Size large to very large; the large berries quite irregular; flesh moderately firm, sweet and of fine quality. In some places it has proved a poor bearer. Its chief value is for the garden.

Glossy Cone.—Size medium to large; beautiful; a perfect cone in

form; flesh solid, but not high flavored; often productive, but sometimes not. Raised by E. W. Durand.

Fig. 277.—*President Lincoln.*

MINER (or Miner's Great Prolific.)—Large, regular, roundish; bright red; very productive; in quality not quite equal to Charles Downing, which it immediately follows. E. P. Roe thinks it has a long future, and that it is as promising as the Sharpless.

CENTENNIAL FAVORITE.—Large, regular, dark scarlet, of high flavor; late; moderately productive; discarded bv some cultivators.

CONTINENTAL.—Large, obtusely conical, regular, dark red, firm, good; productive under hill culture, and sometimes bears well in narrow rows.

GOLDEN DEFIANCE.—Ellwanger & Barry say: "We consider this and the Windsor Chief the two finest and most productive late varieties." Roe says: "For three successive years this has been the best late berry on my place, and one of the most beautiful. If its runners are cut, it is exceedingly productive. Unless it changes its character, it will win its way to the front rank of popularity." The berries are medium to large in size, regular, dark crimson; flesh firm; flavor very good; pistillate. Raised by Amos Miller, Pennsylvania.

WINDSOR CHIEF.—Large, round, slightly approaching conical; dark crimson; flesh moderetely firm, rather acid; plant exceedingly vigorous and productive; pistillate. Ellwanger & Barry say: "The best late variety for market." The "Queen of the Market" appears to be identical with this variety. The Champion closely resembles the Windsor Chief, but is often slightly smaller in size.

GLENDALE (fig. 277).—Fruit large, handsome, long, conical; never coxcombed; bright red; flesh firm, rather acid, not of high quality; a valuable late market sort. E. B. Underhill writes: "Very valuable for market, because firm and productive, but much inferior to Kentucky for home use." The calyx is very large, serving as a useful packing in shipment.

Fig. 277.—*Glendale.*

Messrs. Ellwanger & Barry say:

"Among the newer kinds that have fruited in our collection, we regard the following the most valuable: Sharpless, Crescent, Crystal City, Golden Defiance, Windsor Chief and Black Defiance. Sharpless, owing to its size and good qualities, commands the highest price in our market."

SYMMETRY IN FARM ARCHITECTURE.

AN IMPORTANT CONTRIBUTION would be made to the landscape appearance of farming regions, as well as to the ornamental effect of single places, by a proper attention to neatness, symmetry and architectural taste, in the construction of the exterior of farm buildings. Costly ornament is not recommended, but rather a tasteful simplicity; expensive material is not required to produce the desired effect, for a judicious use of simple materials may accomplish more to a cultivated eye than costly marble worked into awkward forms. A more pleasing structure may be made with unplaned boards used with judgment and skill, than by the most elaborately worked and polished wood in the hands of a bungler.

The few suggestions given in this brief article will be neither scientific nor technical, but such as will be readily understood by any reader, and they are intended for general application—architectural details not being taken into consideration. The cheaper and more effective ornamentation by tree-planting is of course all-essential, but with pleasing forms in building, a complete combination is effected.

Before proceeding to details, it is proper to remark that in all the mod-

erate or smaller structures usually seen in the country, no attempt should ever be made for ornament or show alone. There should be a manifest utility in everything; the *beauty of fitness* should be constantly obvious. A projecting roof, for example, should convey the impression to the spectator that it is made for the shelter of the walls, and ornamental brackets are added for its support. A wooden chimney solely for the purpose of matching a real one of brick, would be contrary to true taste. A steeper or more ambitious roof than interior comfort requires, would be equally objectionable. Heavy columns and a light support are obviously out of keeping. A railing or a balustrade in a position where it cannot be used with comfort becomes an unpleasing object.

The following examples are given as practical illustrations of the views above presented. Fig. 278 represents an old square house, such as was frequently seen half a century ago, and is occasionally at the present time.

Fig. 278.—*Awkward Square House.*

Fig. 279.—*The same Building Altered.*

Its form is heavy and awkward; and when its large frame becomes slightly contorted by age, it has a still more repulsive appearance. Fig. 279 is the same in dimensions. and with a similar arrangement of the rooms inside. The little additional cost has added greatly to its exterior. The small gable in the middle of the front side of the roof (as in fig. 280) cannot be added, as it should obviously be placed over the door, which in this plan is not in the middle. In the larger dwelling shown in fig. 280 the central position of the front door admits this gable, which is the more essential for the longer line of the larger dwelling. This gable exhibits the manifest utility of forming a hood or shelter to the triple window over the door, as well as admitting more light than could be secured from a shorter window under an unbroken line of roof. For a regular dwelling of this size, the uniformity of the exterior is

Fig. 280.—*Larger Systematic Dwelling.*

lessened by placing a bay window at the end, and it also adds to the capacity and pleasant expression of the room.

Fig. 281.—*Simple Farm House.*

Fig. 281 represents an old-fashioned farm house occasionally seen, with no attempt at ornament; and with the exception of being rather low and flat, conveys an expression of a comfortable home. With a little more height, and a somewhat projecting roof, like those of figs. 279 and 280, and small window hoods, it might be adopted occasionally to advantage.

RUNNING TO EXTREMES.—It often happens that when any particular style becomes fashionable or modish, it is carried to a grotesque extreme by persons who are ignorant of true taste. In their eagerness to be in the latest fashion, they adopt tawdry uncouthness. We see this in heavy cornices on light buildings, as in fig. 282, where an attempt is made to engraft a Grecian facade on wooden clapboards, instead of a neat and moderate projection like that shown by fig. 283.

Fig. 282. —*Heavy Cornice.*

Fig. 283.—*Moderate Cornice.*

The Grecian temple, in its place, has an imposing expression, but is wrongly employed for a common dwelling. We sometimes witness such an attempt as that represented by fig. 284, with tall and ambitious columns in front of a common house built of wood or brick. The quiet and seclusion of a hospitable home is lost in the public mart, court-house or exchange. Worse still, if possible, is the incongruous association of classic pillars and unclassic walls and windows.

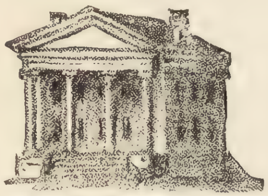

Fig. 284.—*Grecian House.*

Fig. 285.—*House for Defence.*

Again, the attempt is sometimes, but rarely, made to imitate obsolete baronial grandeur, by engrafting the castellated style on a common dwelling, as in fig. 285. The turrets and battlements are no longer needed

for the protection of families against the arrows and darts of marauding bands, and it has been centuries since such structures could resist artillery. The additional objection exists of incongruity between the towers and common windowed walls. Fig. 286 has not the objection of a want of harmony, being wholly a castle on a miniature scale, but like the other is entirely out of place in a country not infested by armed bandits, but where the security and quiet of peace always reigns. Yet a popular work on American landscape gardening represents and recommends both of these styles for private dwellings. They have pre-eminently the fault of a want of fitness.

Fig. 286.—*Castle.*

Fig. 287.—*Excessive Steepness.*

Gothic Steepness.—Years ago, when the cottage Gothic style was introduced, the roofs of that style of building were made so much steeper than the former flat roofs, that builders possessing little architectural knowledge thought that the steeper they were made, and the further removed from the previous mode, the more fashionable they would become. The extreme thus produced, and represented in fig. 287, is an

Fig. 288.—*Gothic Dwelling.*

exact copy from a figure in a publication on rural architecture, which appeared some years ago. Scarcely a remark is necessary in contrasting this building with the one represented by fig. 288, with its moderate and tasteful form, or with the simple cottage style of fig. 289, which represents a small country or village house, with regular outline, and with the

eaves, window hoods and door covers sufficiently projecting to give the whole a finished and sheltered expression. About the same time that

Fig. 289.—*Symmetrical Cottage.*

the above mentioned faults begun to prevail, the attempt was made by some builders to obtain a great deal of ornament at small expense, by means of a huge and tawdry verge-board—fig. 290.

One of the later fashions, which has been largely adopted of late years

Fig. 290.—*Tawdry Verge-boards.*

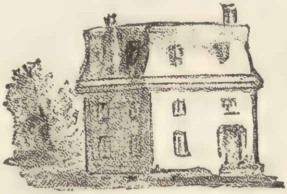

Fig. 291.—*French Roof.*

in some parts of the country, is the "French roof," fig. 291. This roof, in some of its varying forms, may do well with its dome-like appearance for large public buildings, such for example as the New-York post-office, and for structures of a similar character and magnitude, but it is heavy for a small residence, and does not possess the merit of simple *fitness* for shelter, the expression of which is conveyed by such a roof as in fig. 289.

SOME DETAILS.—A few of the figures here given will show the general

Fig. 292.

Fig. 293.

Fig. 294.

Fig. 295.

form of some of the parts of buildings employed to produce a pleasing

effect combined with utility. Fig. 292 is a curved window or door hood; in fig. 293 it is straight and plain; fig. 294 exhibits one with double roof, and fig. 295 represents a window with awning over a balcony.

Barns of Respectable Appearance.

Works on landscape gardening sometimes inform us how to conceal barns from view by the dense planting of trees. They take for granted the erroneous assumption that a barn is necessarily an ugly object. There is no reason why it should be so. On the contrary, with a well designed exterior, it may become a positive ornament, conveying to the mind of the spectator the completeness of the farm residence. It may have a high finish outside, or it may be made of unplaned boards, and in either case may alike have a symmetrical or pleasing outline. The addition of screen trees increases the ornamental effect. The mistake must not be made of making a barn resemble a house outside, as this would conflict with the idea of fitness, but the fact should be at once obvious that the building is a barn, however architectural its outline may be. It is not necessary to incur additional expense in producing a good ornamental effect. Rough boards may be employed to excellent advantage, and if these, after the building is completed, receive a heavy coat of crude petroleum, (applied

Fig. 296.—*Carriage-House.*

rapidly with a coarse brush,) they will be in a better condition to withstand the weather and decay than if covered with a coat of paint, while the cost of the crude oil will be many times less.

Fig. 296 represents a small barn or carriage-house, with sufficient ornamental addition in a projecting roof, door covers, &c., to give the whole an attractive exterior. It is given merely to show how the same style of finish may be applied to larger barns to advantage, and with little additional cost.

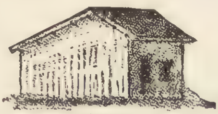

Fig. 297.

Fig. 298.

The smallest structure may exhibit the taste of the owner. A simple cow-shed, built of cheap material, as shown in fig. 297, would be admitted by any one as being better than that shown in fig. 290, nearly the only

additional expense being the upright battens, the benefit of which, in stiffening the walls and excluding cold currents between the boards, is greater than their cost.

The barn, when placed near the dwelling, should present a better finish than if on a remote part of the farm. There should be some resemblance

Fig. 299.

between them in the style of the exterior. A Gothic residence, as in fig. 288, for instance, may have such a carriage-house or barn as the one represented by fig. 299. If more distant, this resemblance is less necessary, and a large barn for holding the main crop will appear well if constructed like the one shown

Fig. 300.

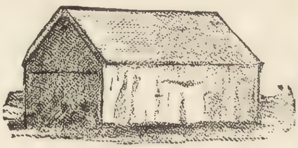

Fig. 301.

in fig. 300. The most casual observer will admit that such a building has a better appearance than the old barn in fig. 301, in which no attention whatever has been given to effect.

It was quite common some years ago to build barns with a curb or gambrel roof, like fig. 302, with the claim that greater space was secured with the same exterior. There are, however, several disadvantages. It requires framing a double set of rafters and an extra plate on each side, and requires nearly double the labor in shingling. The inside space may be more cheaply obtained by slightly increasing the length of the posts, say two or three feet at most.

Fig. 303 shows the curb roof, with the common roof in dotted lines, and the small economy of exterior covering in the former is obvious,

Fig. 302.—*Curb-roof Barn.*

Fig. 303.

while its external appearance is not in its favor. This mode of building has consequently nearly passed out of use.

The few hints contained in the preceding article are given to invite attention to the subject, in favor of tasteful simplicity in the exterior of buildings, and not as a complete treatise on the subject.

THE IRRIGATION OF MEADOWS.

By an Agricultural Engineer.

GRASS IS A CROP of which we can never have enough. Even with a maximum yield, the farmer or dairyman must depend upon green fodder crops, both to help out his pasture and his winter feeding. Grass is the basis of our agriculture, the main dependance of all our live stock, and therefore the key to success in all other farm operations. Every farmer knows this so well that it may "go without saying." Whatever means therefore can be made available for the safety of our present average crop of grass—for the present year is typical of too frequent dry seasons, which reduce the yield so disastrously—and whatever methods may be practiced for its increase, are of the greatest importance. Irrigation is the only sure way to attain these desirable ends. Without water the farmer labors and waits in vain. The richest soils are as barren as the driest desert if moisture is withheld. But with copious watering poor soils, and even a blowing sand, may be made to produce grass bountifully, and, in the producing of a valuable crop, may become year by year improved in condition, so that in time they may be profitably brought under a system of general agriculture. Grass is a product that changes the mineral constituents of the soil to a certain extent into vegetable matter, and in its constantly growing, maturing, dying and decaying roots and stems, which are perpetually renewed, phœnix-like, from the and dust

ashes of former herbage, constantly supplies the vegetable portion of the soil which is required for complete fertility.

Irrigation is no new thing. It is as old as the human race, for the garden of our first parents was watered by a river. It is not a practice confined to dry soils and climates, for in England (the climate of which is considered as excessively moist, and where it rains two days out of three), irrigated meadows exist wherever the conformation of the land and the supply of water combine to make them possible. No opportunity of this kind is lost, for an irrigated or water meadow is so valuable as to form a very desirable addition to a farm, and one that is always considered in the rent too, the money value of such a meadow ranging from $500 to $2,000 per acre, and the rental paying the usual rate of interest there current upon that enormous valuation. Here, although our rainfall is one-half larger than that of England, yet our hot sun and parching winds, the irregularity and frequent unseasonableness of the rains, render the practice of irrigation of vast importance to us. Its extensive use will not only serve to utilize water which now flows away uselessly, but it will tend to store up the excess of water, and hold it in the soil, releasing it gradually and evenly, much in the same manner as was formerly effected by the wooded lands which bordered our streams and water courses. In addition, the evaporation from the watered lands will remedy to a proportionate extent the dryness of our summer atmosphere, and, be this ever so small in effect, it will be an advantage as far as it goes.

The practice of irrigation is by no means costly. Where water can be procured in a convenient position above the level of the land to be watered, the cost will be trifling. Under the most troublesome circumstances, the necessary arrangements will cost less than thorough drainage of the same land; yet what talk there is of drainage, and what enormous sums of money are yearly spent to carry off the surplus water from land, while nothing is thought or heard of the need of bringing that water back again to other lands where it is sorely needed! If drainage is good for wet lands, irrigation is equally good, its counterpart in fact, for dry lands. Once made, the works needed for irrigation are made for a life-time, and the greater part for centuries. I have seen European water meadows and irrigating ditches which have been in use, or so said to have been, for a thousand years, and some of them were constructed by the old Romans, whose engineering in some respects, certainly so far as solidity of work is concerned, surpasses our modern practice. And in our own country we may see, in the Southwestern territories, water meadows and ditches which were made long before the discovery of this continent by Columbus, and which are still in use. So in cheapness and effectiveness of construction the practice of irrigation commends itself to our notice most favorably. But where water must be raised, one need not deny himself of its advantages while wind, water and steam are such cheap motive powers, for the raising may be cheaply done.

How to Make a Water Meadow.

A water meadow, strictly speaking, is a level piece of land on the bank of a stream, so situated that the land may be banked to retain the water, and ditched to carry the water off when the soil is saturated, and that the water of the stream may be brought by its natural gravity from a higher level above, or may be raised by damming or by some cheap mechanical power, such as a water wheel or windmill. For the better under-

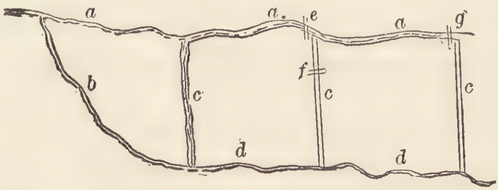

Fig. 304.—*Plan of Water Meadow.*

standing of the necessary arrangement the accompanying diagrams may be useful. In fig. 304 is given a plan of a typical water meadow. The stream is shown at *a a a;* the ditch by which the water is taken from the stream at *b;* the banks to retain the water at *c c c;* the distributing ditch at *d d;* the waste outlets at *e, f* and *g*. In fig. 305 is given a sectional view of the surface of the same meadow from the upper to the lower part, parallel with the course of the stream, and in fig. 306 is shown a section across the meadow from the high ground to the stream. The reference letters are the same in all. The method of construction is as follows: The land is first plowed and levelled by means of a scraper, if necessary, so as to get a smooth surface with a very gentle slope towards the stream or down the course of it.

Fig. 305.—*Section along the Stream.*

Fig. 306.—*Section across the Meadow.*

The water should be brought on the meadow at least two feet above the surface of the ground—the height however may vary according to circumstances; if the land if very nearly level, or made level, six inches or a foot of water may completely flood it; or if the slope is more than two feet in a ten-acre field, cross banks may be made to divide the field into sections, each of which may be flooded from the other, as in fig. 305. It is rarely that the land is so nearly level that ten acres may be all flooded with six inches of water, but such cases do occur, for as I write I look out upon a tract of land of nearly thirty acres which could be wholly covered with this depth of water, so gentle is the slope of the ground.

The water is brought from the stream by a ditch or channel with a fall only sufficient to carry the water, and which diverges gradually as the land slopes with the fall of the stream (*b*, fig. 304) until the boundary of the proposed meadow is reached. The water is then led along the upper boundary of the land (*d d*, fig. 304, and *d*, fig. 306) in a channel made with as little slope as possible; it may be perfectly level if desired, and this is important, because one or two inches lost in the fall may either leave out some land that might be watered, or make it necessary to construct higher retaining banks, or a deeper ditch.

The construction of the conducting channel *b*, and the distribuing channel *d*, should be such that when the lower part of the ditch *d* is filled, the water should stop flowing, and a level be reached from the inlet at the stream to the end of the ditch. This, however, may be varied to suit exceptional cases. The water is then ready for distribution. Small wooden boxes should be built in the bank of the ditch made, as shown in fig. 307, having sliding plugs, which may be drawn out to let the water escape. When the water is required, the plugs are drawn out and the flow escapes on the meadow. There should be a discharging box at every one hundred feet, and the box need not be more than six inches by two or three inches, or twelve to eighteen square inches of sectional area. The water is left to flow until the ground is flooded, if it is capable of this, in the manner shown by the dotted line in fig. 306. Otherwise the flow is distributed so that it is spread over the whole surface, and runs in a sheet down the slope to the foot of the meadow, where it escapes at the waste-gate *g*. In the former case the water is retained by the banks *c c*, fig. 304, and may be left on the surface for twenty-four hours, or even longer at certain seasons.

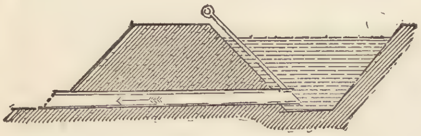

Fig. 307.—*Water-Box in Ditch and Bank.*

Where the nature of the ground obliges it, and the land has been laid out into sections, as in fig. 304, and one section has been filled, the flow may be continued and the gate at *f* be opened to turn the water on the next section, from which it escapes into the stream at *g*, unless it is required for still another section below it. But it is preferable to use the water only for one section at once, and to flow each separately from its own individual part of the ditch, *d d*, for water is a fertilizer as well as a food for plants, because of the saline or mineral matter it may have in solution or suspension. River water is especially valuable in this respect, on account of the fine sediment which it carries, this being very considerable in times of freshet. This sediment is deposited when the water is retained on the meadow for any length of time, or is made to flow very slowly over the surface.

Another method of watering meadows is by flowing instead of flooding. The water in this case flows over the surface from a series of ditches and furrows, in the manner shown in fig. 308. The water channel *a* corresponds with that at *d* in the former plans, and is supplied with water in a similar manner. But the distribution is effected differently. The main channel supplies other inferior ones, *b b*, and these in their turn supply others, *c c*, from which the water is caused to overflow, over their lower edges, down the slope. The number of ultimate channels depends upon the nature of the ground; they should be sufficiently numerous to give every portion of the land an adequate supply.

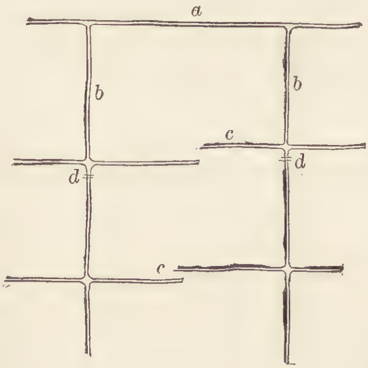

Fig. 308.—*Field Watered by Flowing.*

The main ditch at *a*, fig. 308, is constructed similarly to that shown in fig. 307. The others, *b* and *c*, should be made wide and shallow, so that no obstruction is offered to cutting the grass either with scythes or machines, and the surface of each is covered with grass to preserve the conformation. The form of the water furrow is given in fig. 309, and one made by a plow for temporary use in fig. 310. The latter is made by running a plow along the line of the required channel, and finishing the furrow with a hoe. The current of water may be stopped wholly or partially, and wholly or partially diverted into lateral channels, by small hand-gates of sheet-iron or zinc, fig. 311, each provided with a handle and two sharp feet, to give it a stronger hold upon the ground when used in grassy ditches. These are thrust into the ground wherever it is desired to turn the water into lateral furrows, as at *d*, fig. 308.

Fig. 309.—*Permanent Water-Furrow.*

Fig. 310.—*Temporary Water-Furrow.*

Fig. 311.—*Hand-Gate.*

This manner of distributing water may be used for hillsides upon which springs may be found, or upon irregular ground upon which water may

be gathered in reservoirs or ponds in rainy seasons, or be raised by mechanical means.

Irrigation by springs upon hilly ground is frequently available and may be very usefully employed. The water from one or more springs may be brought together by means of drains, and directed into a main channel as at *a*, fig. 308. From this the distributing channels must be made to run with the least possible slope along the side of the hill so as to lose as little elevation as may be, and following the curves of the level as shall be required. If the supply is copious, this channel may be returned as shown in fig. 312, from one side to the other of the field, and made to overflow in places, as shown, in such a manner as to spread the water in all directions down the slope.

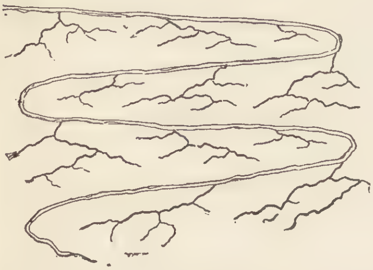

Fig. 312.—*Watering a Hillside.*

This distribution may be assisted or controlled by using the hand gates above mentioned, or by placing stones in the channel.

The effect of watering a meadow is remarkable. Where warm spring water is to be procured, very early grass may be grown, and a hillside may be kept green during a whole winter by the flow of a copious spring over it. Winter irrigation however is to be very cautiously used, and never where severe frosts may occur while the ground is saturated. In some localities, where ice may not be formed more than two or three inches in thickness, a water meadow may be flooded with benefit throughout the whole winter, and the water drawn off as soon as growing weather occurs. But this even is an exceptional practice. Usually meadows of this kind are flooded early in the spring for a week or two during seasons of high water for the benefit of the alluvial deposits, as well as the moistening of the ground. A thorough soaking of the ground is generally sufficient to give an early crop of grass for hay or for green feeding, and as soon as the crop is removed a watering is given for another week or two, until a second growth is well started. In this way several cuttings in a season may be procured, and an aggregate of ten to twelve feet of grass may be produced in the several crops in one season. Or periodical watering may be given whenever it is desirable, at night being the best period; but never in times of freshet, when the water is full of sediment, and when the grass is long, lest it be so sanded as to interfere with the cutting. Watering when the grass is tall is never required, and would be injurious, causing the herbage to lodge and fall down. If such a mistake is committed, the water should be drawn off and the grass cut without delay, to prevent it from rotting.

The heavy growth caused by irrigation must be supported by adequate fertilizing. A top-dressing of fine compost in the fall, of superphosphate of lime, plaster, Peruvian guano, and other fine fertilizers, only should be used.

The varieties of grass that may be grown in water meadows are numerous. Timothy, red-top and red clover will flourish under moderate watering, but in flooded meadows will be killed out by several days' exposure to the water, which will only excite the growth of some other grasses. *Poa serotina*, fowl meadow grass; *Poa trivialis*, rough-stalked meadow grass; *Agrostis vulgaris*, red-top, and *Arrenatherum avenaceum*, tall meadow oat grass, are all suitable for water meadows; while an excellent and remarkably prolific grass, the common blue joint, *Calamagrostis canadensis*, thrives to perfection on them, and has yielded at one cutting six tons of good hay to the acre over natural water meadows of hundreds of acres.

A water meadow, being a permanent grass field, will need to be kept in good condition by occasional partial re-seeding, the use of some fertilizer, and smooth mowing, and occasional rolling. After the last mowing in the season, the water should not be turned on unless it is kept on all the winter, lest a dead aftermath cumber the meadow the next season and become an obstacle to the mowing. If such should happen, it would be advisable to burn the dead grass in the spring, on a dry, windy day, so that a clean sweep will be made; and the water should be turned on immediately.

The literature of the art of irrigation is but scanty, with the exception of some French and Italian works. The only American work on this subject is one by Henry Stewart, viz., "Irrigation for the Farm, Garden and Orchard"; the English works are confined to descriptions of the Spanish and Italian methods, with the exception of a chapter included in R. Scott Burns' "Outlines of Modern Farming."

[A complete and practical treatise, in the Spanish language, was published about two years ago by Prof. Andres Llaurado of Madrid, and probably represents the latest European practice up to that date. See notices in the COUNTRY GENTLEMAN for 1878, pages 680 and 809.—EDS.]

PEACHES IN AMERICA.—A handsome book, published in London in 1839, contains the following statement: "It is no unusual thing to see an American peach orchard containing one thousand trees growing as standards, as the apples do with us, and after the juice is fermented and distilled, producing one hundred barrels of peach brandy. The Americans usually eat the pavies or clingstones, while they reserve the melting or freestones for feeding their pigs." Again: "In the United States the stones of the peach are sown on a seed bed. In the fourth or fifth year they produce fruit, and thus thousands of sub-varieties are produced; not one perhaps in ten thousand is fit for the table."

WINDOW GARDENING.

On riding lately through one of the large villages of New-York we counted more than four-fifths of the residences with blooming plants in the windows. This is not an unusual instance; the culture of flowers in pots has become almost universal in many parts of the country. Its pleasing influence, and the eminently beneficial effects in thus adding to the attractions of home, are sufficient reasons for offering every encouragement to the practice. As the cultivation of house plants increases, the more frequent are the inquiries for the best modes of management, and for selections of plants best adapted to growing in living rooms. To meet these inquiries is the object of the present article.

Position for Plants.—The first thing to decide when about to procure house plants, is the position where they are to be placed. The leading object with most cultivators of house plants is to secure blooming in winter, but an abundance of flowers at all seasons of the year should not be overlooked. Residents of towns and villages, who may have but little out-door space, may place their pots outside as well as inside the windows in the summer season, and obtain all they desire by securing beforehand a proper succession of plants, and by attaching to the windows suitable shelves and boxes. Compactly trained plants, combined with trailers and creepers, may be employed to give a fine display.

The sunniest window must of course be chosen in preference to any other, where practicable, or a southern or eastern exposure selected. If the plants are to be placed outside, strong brackets may be employed to support the box, if it extends the whole breadth of the window; or if pots alone are used, a light shelf is to be secured to the brackets. Climbers may be trained on cords extended in any desirable direction, and trailers allowed to droop below.

Rustic Boxes.—For small houses, or for rear windows, rustic boxes have a pleasing appearance; but for front windows, or for large dwellings, rustic work, if employed at all, should present a neat, finished and symmetrical appearance, and resemble mosaic. Different modes may be adopted for making rustic boxes. They may be made of inch pine boards, and afterwards covered with twigs split into halves and fastened on with brads driven through holes made with a carpenter's awl. The twigs or branches selected for this purpose should be equal in size for each box, and may be of any size from three-fourths of an inch to an inch and a half in diameter. Or the bark of trees may be fastened on in wide sheets; it should be selected from trees so large as to have become rough or furrowed to some extent. As the boxes are much exposed to warmth and moisture, they are liable to decay soon if not protected, the best way for which is to soak the boxes well with crude

petroleum, by applying two or three coats with a coarse brush, and after drying a few days, nail on the rustic covering, and then give this covering another washing with the petroleum. This mode of treatment is both cheaper and better than paint for the box and varnish for the rustic work.

Fig. 313.—*Wire Stand.*

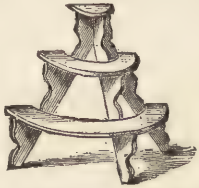

Fig. 314.—*Wooden Stand.*

Stands made of wire (fig. 313) have a neat appearance. Simple semicircular stands of wood, (fig. 314,) well painted, and washed often enough to be kept perfectly clean, answer well.

For in-door plants the stands may be placed in front of the window to receive the pots; or instead of pots a continuous bed of soil may be placed in a box. This may rest on the stand or table, or it may be provided with legs and become a box and table combined, fig. 315. Or strong brackets may be employed for supporting the box, fig. 316. The importance of a piece of heavy oilcloth under the stands, to catch dripping water, will be understood by every housekeeper.

Fig. 315.—*Rustic Box and Stand.*

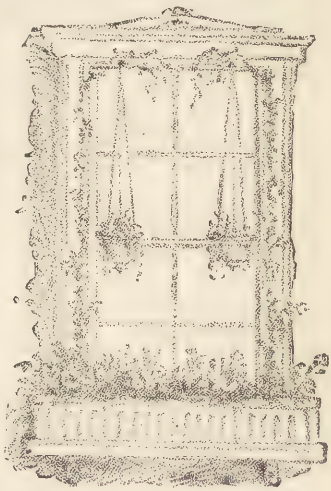

Fig. 316.—*Flower Box on Brackets.*

Rustic tubs, made of any material and covered as represented in fig. 317, for hyacinths and other bulbs, have an attractive appeerance. An easy and

good way to make one of these combined contrivances is to place three or four pots on a board, cut just large enough to receive them; bind them together with a cord or wire, and then cover them with

Fig. 317.—*Rustic Pot Covers.*

broad sheets of slightly rough bark from a tree, wiring on the bark. These divisions into parts prevent the heavy appearance imparted by a continuous box or tub.

SUPPORTS FOR POTS.—Single pots may be placed against the side of a window, by inserting two strong staples, to receive the iron sup-

Fig. 318.—*Support for Pot.*

Fig. 319.—*Hanging Support for Pot.*

port or ring in which the pot is set, the whole acting somewhat like a crane, fig 318. Another mode, which requires no explanation, is shown in fig. 319.

WARD CASES, by enclosing the contents, prevent the injurious effects of dry air and dust on the plants, and obviate frequent watering,

but are only adapted best to such plants as ferns, which will bear this confinement. The same advantages may be obtained, on a smaller sale, under a bell glass on an iron stand, as shown in fig. 320.

Fig. 320.—*Bell Glass for Pots.*

Fig. 321.—*Bay Window Enclosed.*

BAY WINDOWS.—These advantages (of security against dry air) may be partly obtained by house plants generally when a bay window is furnished with them, by inner sashes enclosing the space made by the recess. These inner sashes swing on hinges, and are opened or partly opened when warmth is to be given from the room, and closed to exclude dust or dry air, or to hold the moist air—fig. 321. The same end may be secured where there is no bay window, by constructing a case inside, a foot or so into the room, and extending down to the window sill, and half or all the way to the ceiling.

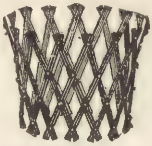

Fig. 322.

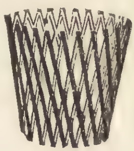

Fig. 323.

THE BEST POTS.—The common unglazed earthenware pots are best, and before using, whether old or new, they should be well washed. If not sufficiently ornamental, the covers shown in figs. 322 and 323 may be used, and will give them a neat appearance. These covers are sold at low prices at seed stores. If wooden tubs are used, they should not be painted or oiled, as the porous sides are useful in keeping the soil in good condition, and preventing souring. If the outsides of pots are washed every

two or three weeks, they will not accumulate mould, but will preserve a neat and fresh appearance.

Soil and Composts.—A good soil for the pots is of vital importance. As the roots have narrow quarters, the deficiency of space must be made up by rich food. A good mixture consists of about equal parts of turf and old cow manure, well rotted and mixed together. If the turf is taken from heavy or clayey soil, a portion of sand should be added. An addition of bone dust is often useful. It is not necessary that this course should be blindly followed, but equivalent ingredients will answer. Cow manure one or two years old is found best for manure, and better adapted to delicate plants. Whatever the ingredients may be, they should be mixed and remain all summer, to become well incorporated. The best way of doing this is to make a square heap, as shown in fig. 324, placing the ingredients in thin alternating layers, and making a depression at the top, holding one or more pailfuls of water, for keeping the heap moist in time of drouth, Pour water, slops, &c., into the cavity, as may be required, but do not make it too wet. Before using, mix the ingredients thoroughly together, and pulverize them well. Rubbing through a sieve accomplishes this end well.

Fig. 324.

Good Plants Important.—As plants for the window do not have the advantages received by those which grow in the greenhouse, it is important that healthy and vigorous ones be selected for window gardening. Small and healthy plants are therefore to be preferred; they take up less room, and by pinching they may be kept in a neat, compact form.

Fig. 325.—*Fuchsia Trained Compactly.*

Pinching-in.—The preservation of this symmetrical form is easily secured if the pinching process is begun early, but is difficult or impossible after the plants have grown tall and lank. Any one who has seen a plant properly thus treated,

as for example the Fuchsia in fig. 325, will appreciate its incomparable superiority to a neglected plant with only bare stems.

Open Ground Treatment.—Plants which are set out in the open ground, even with the surface, for growing during the summer, should remain in pots, (fig. 326,) so that they may be removed without checking them when taken up for the house in autumn. The upper soil of the pot may be removed and replaced with fresh, rich soil, and the rest of the contents of the pot may remain, and additional vigor imparted by watering with weak liquid manure; if strong, it will be likely to ruin the plants. A better way, however, is to change them every month or two into slightly larger pots with rich soil, and water moderately, without applying liquid manure. But for many sorts the best bloomers are obtained in young plants, raised either from the seed in spring, or obtained from cuttings under glass set soon after mid-summer.

Fig. 326.—*Pot in Open Ground.*

Summer Windows.—The selection of plants for the window, must depend on the position in which they are placed , and on the treatment they are to receive. If for the outside, and fully exposed, such plants as grow freely and bloom well in any situation may be chosen. Green-house and hot-house plants for the outside should have a sloping glass cover, to retain moisture, and to secure more warmth. For both these positions, large showy flowers, with bright colors, are best. For the inside, and against the light, such as present a neat and graceful outline are to be preferred.

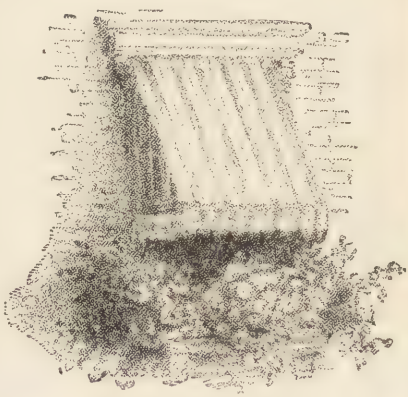

Fig. 327.—*Outside Garden.*

Fig. 327 represents the pleasing appearance given to the outside of a window by an awning, the colors of which partly harmonize with those of the flowers. These colors, however, should be rich rather than brilliant and flashy. Such windows

may properly face the flower garden or the ornamental grounds. The plants are set in a box on brackets, and should be free growers and bloomers, in rich, well watered soil.

SHIFTING POTS.—In removing plants from a small pot to a larger, see first that a sufficient quantity of draining material is placed in the bottom, and on this place enough soil to raise the upper surface of the roots to within an inch of the top. Run a knife around next to the pot, to make the soil separate easily. Press the soil between the roots and the sides of the pot with a strip of wood, so as to leave no interstices. Covering the surface of the earth with a flake of green moss from the woods, gives the pot a neat appearance, and prevents a crust from being formed by watering.

FILLING POTS.—The bottoms of boxes may be filled for an inch or two with broken charcoal, and for outside window plants, which need daily watering, a soil must be made that will not become too compact. A liberal mixture of sand, or of granulated charcoal, answers a good purpose. Well sifted coal ashes may be employed in the absence of either of these.

SELECTING AND PROCURING PLANTS.

A distinguished florist says that "of the tens of thousands of pot plants sold in the spring from street stands, probably not one in ten survives." They are forced into bloom in small pots, have little vigor, and very few ever give another flower. Plants from a warm greenhouse should be gradually inured to the cooler rooms where they are to remain. If they are to be taken from the garden in autumn, they should be carefully potted early in September, and hardened in the shade outdoors, removed to the rooms as the nights become frosty, and have plenty of fresh air on warm and sunny days.

Among the plants which may be selected to decorate the windows of a living room are pelargoniums, callas, abutilons, Persian cyclamen, several species of oxalis, Chinese primrose, fuchsias, &c. Other sorts are favorites with different cultivators. As a general rule in making selections, choose old, well tried ones, and touch very lightly on high priced or new sorts.

FOR NORTH WINDOWS.—Where from necessity windows facing the north, or entirely shaded, must be chosen, the following plants may be selected as most likely to succeed well: Lycopodiums, ferns, centaureas, English ivy, maranta, canna, tradescantia, &c., which are cultivated for their foliage and not for flowers. Several small flowers do well in the shade, such as pansy, auricula, &c.

SOME DETAILS OF TREATMENT.

The *Chinese Chrysanthemum* may be made to bloom during the last half of autumn and to the end of the year. For a fine display, much depends on a selection of colors, of which there should be a large number of white ones, to set off the yellow, orange and red varieties. When the flowering has passed, the plants are to be placed against a well lighted

window in a cellar, and watered lightly about once a week. As spring approaches they may be brought out, and more light, water and heat given to start new young shoots, which they will throw up, and of which young cuttings may be made. These are placed in pots of sand under a bell glass, and the old plants thrown away. Or large numbers may be obtained by dividing an old plant. These may be placed at once in the larger pots for blooming in autumn, or they may be changed successively from small to larger pots safely, with sufficient water. As soon as vigorous growth commences, pinch the tips, to keep them in a neat, compact form, but do not continue the pinching much after mid-summer. As soon as the flower buds appear, water with liquid manure; and if the manure water is supplied all the season they will grow all the better for it.

Pelargoniums are easily raised from cuttings, the most certain mode for which is described on page 230 of this volume of RURAL AFFAIRS. New or one season's plants which have not bloomed, furnish a more certain supply of flowers through winter. When the plants which stand in open ground are to be potted for winter, a circle should be cut around them a fortnight previously, a little smaller than the pots they are to occupy, to furnish them with short, new roots.

Cuttings of *Fuchsias* root readily when placed next to the rims of pots, and kept warm and moist, and they will bloom well the next year.

Roses succeed best when grown in pots, and not taken from the open ground; avoid over-watering or soaking with standing water, and if the soil is not rich enough, apply liquid manure once a week. Shower once or twice a week. Cut back each shoot that has blossomed, to a good bud.

The air of living rooms is usually too dry for *Verbenas*, but they may be kept in small pots placed on shelves close against the glass of the window, the room kept rather cool in the night and well aired in the morning, and every few days washed in a pan of tepid water. Strong plants from August cuttings should be used.

Fig. 328.—*Chinese Primrose.*

A correspondent of Vick's Monthly gives in substance the following method for obtaining a fine bloom from the *Chinese Primrose*, fig. 328. The seeds are sown in April or May every spring, for the plants are not worth much after they have bloomed all one season, and these are thrown away. The young plants obtained from the early sowing are set in small pots when well started, and plunged in a cold frame, taking care subsequently to shade and ventilate them properly. The cold frame is regarded as absolutely essential to success. Before mid-summer the plants are set on the north side of a building, and the frame turned

about to face the north, and the sash opened enough to give plenty of fresh air. Some shade is required on very bright days, and the protection of the sash if a cold storm approaches. The plants are thus prepared for winter, and they will then bloom all winter and into spring.

Hyàcinth bulbs for winter blooming should be kept cool and dormant in autumn, to prevent the new growth from starting and consuming the bulb. Plant in earth in a pot, and keep in a cool place so that roots may form before the bulb starts. In water-glasses they become more exhausted than when planted in pots in the earth, and the latter mode is to be preferred.

Fig. 329.—*Cyclamen.*

Fig. 330.—*Bouvardia.*

The *Cyclamen* (fig. 329) is a beautiful plant for windows, and does best when a cool and moist air can be secured. The pots during summer should be placed in a cool and shady place till removed in autumn to the window.

Fig. 331.—*Abutilon.*

Bouvardias (fig. 330) furnish some of the finest white flowers, as well as pink and bluish colors. Like the cyclamen, they need moisture, as well as a strong light. New plants are easily raised from cuttings, or from cuttings of the roots.

Abutilons (fig. 331) more strictly belong to the greenhouse, but with care, and acquaintance with the needs of the plants, and the needed pinching-in, they have been made beautiful window ornaments. They require plenty of water and sunshine, and frequent sprinkling of the foliage.

There are many other plants which succeed well as winter bloomers, including such annuals and hardy perennials as are commonly grown

outdoors, but the limits of this brief article preclude further notices, the preceding being given as specimens of some of the best.

Large Window Garden.

A correspondent of the Country Gentleman describes a miniature garden set against a wide show-window, on the north side of the building, which stands on the south side of an east-and-west street. The following description will afford some useful suggestions to those who have windows in the same position:

A shallow box, about three feet wide and eight feet long, made of inch boards, put together with white lead, fills the space. excepting that a papered board is interposed between the box and the front sash-bar. A little fountain in the centre contains in its basin a few sprays of isolepis—the rush-like grassy plant often seen in hanging baskets—and one water lily. The narrow low-mounded bed, in which the fountain is set, is surfaced, like the other beds, with leaf-mould, over which spreads a gauzy covering of bright, moss-like *selaginella.* A ring of stars of a silvery-leafed sedum (carneum) shines out from the green of this central bed. The others have a few well-chosen plants in plunged pots—begonias, lycopodiums, silver-edged geraniums, ferns, artillery plants, a speckled arum, a fuchsia and a rose; but this latter has lost some of its leaves, perhaps owing to the gas, there being two large burners in the "sky" of this garden.

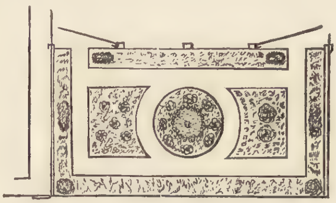
Fig. 332.—*Window Garden.*

At the sides are two niches, like bowers, containing contemplative little figures, canopied by ivies, which wander up to the "blue sky." Standing on brackets are two large goblets, containing pretty pebbles and goldfish. There is rock-work, too, in the mossy green, and some detached boulders, all of water-worn veined marble. Tall plants of the heath-like fabiana stand like sentinels in two corners, the giants of the place, two feet high.

Management.

General Rules.—The treatment must vary more or less with circumstances; absolute rules to follow blindly cannot be given. But the general directions may be safely adopted, to give plenty of sunshine if possible; avoid a dry atmosphere, give plenty of fresh air whenever warm enough, and a little if cold; turn frequently; preserve symmetry; remove dead leaves; loosen the soil; re-pot as they need it, and keep a supply of prepared rich soil on hand, to use as required.

Watering.—In watering plants in pots it will not do to pour on the water indiscriminately, without regard to the character or condition of the

plant. Succulent-leafed plants, such as the cactus, require very little water; callas and all semi-aquatic plants, need much more. Plants which are growing rapidly or forming flower buds, require many times as much as those in a nearly dormant state. Small pots dry more quickly than large ones, and may sometimes need water once or twice a day. Novices usually give small pots too little, and large pots too much water. Observation and experience will soon teach the right course to adopt.

LIQUID MANURE.—For rampant growers with full foliage, and especially as they approach blooming, liquid manure may be applied once or twice a week, but care should be used to have it weak. Many failures result from using it too strong. A spoonful of guano is enough for a gallon of water, or half a teaspoonful of liquid ammonia to the same quantity. It is better, however, to depend generally on a rich soil, with such changes of pots as may be required.

FROSTED PLANTS.—On very cold nights, when there is danger that the plants may be frozen, they may be either removed to some distance from the window, or if in fixed boxes, pin newspapers over or around them, or between them and the window panes. Two thicknesses of paper are more efficient by enclosing a thin stratum of air. Should they become actually frosted, remove them, before thawing, to a dark, cool place, cover the earth or top of the pot with stiff paper, and shower them with quite cold water from the watering pot as long as any ice can be discovered in the pots. Keep them where the temperature is a little above freezing, gradually raising the temperature for a few days, so as to inure them slowly to the warmth of the room.

Plants would thrive best if the temperature by night never went below 45° Fah., nor above 50° or 60° by day.

DRY AIR.—The dry air of living-rooms may be improved to a great extent by keeping water constantly in an evaporating pan, either on the stove, if this is used for heating, or in the air-chamber of a warm-air furnace, if employed for the purpose. To keep the air of the room properly moist, there should be at least eight or ten gallons evaporated every twenty-four hours for every room occupied during the day, containing two thousand cubic feet of air. The pan should be placed where it will receive heat enough to produce this amount of evaporation. The quantity must of course vary with the coldness of the weather, the air when heated having a greater capacity for moisture if cold without, than if warmer. This great amount of required water is scarcely ever appreciated, and is rarely supplied, and hence the common deficiency and failure.

DUST.—The dust which arises in rooms from sweeping carpets settles on the leaves, and seriously injures growth, and destroys the fresh appearance of the plants. The foliage should therefore be washed with tepid water as frequently as may be necessary. Using a carpet sweeper, which gathers the dust in its box, lessens the trouble.

Remedies for Insects.

The aphides, or green flies, when few, may be removed with thumb and finger. Or they may be repelled with tobacco. This may be steeped in water, and the dark infusion thrown on the plants twice a week with a syringe. Or the leaves may be dusted with powdered tobacco or snuff. Or, still better, the plant may be encased in paper or muslin, under which a little tobacco may be burned a few times. The best way to do this is to place the pot on a table or broad board, on which there is an inch or two of sand, and then cover it with the muslin, or with any inverted vessel large enough, the sand making the edge fit closely. Burn the tobacco carefully under the cover, and let the smoke remain ten minutes. This remedy will apply to most insects. The green fly may be destroyed, when tobacco cannot be used, by procuring a few lady-bugs, and placing them on the plants.

The red spider makes its appearance when there is too much heat and too little water, and the best remedy is to place the pot on its side and syringe the under side of the leaves with cold water. Ants are caught and destroyed by pieces of bread steeped in sweetened water.

Rose-bugs may be caught on the plant. The grubs of the rose-bug may be cleared off from the roots which they infest, by shaking off the soil in summer and then replanting in fresh, clean soil. Worms among the roots are got rid of in a similar way. Mustard water for watering has been found useful for driving insects generally from the soil.

CURCULIO CATCHERS.

THIRTY YEARS AGO very few owners of plum orchards understood why the abundant and newly set crop of young fruit all dropped to the ground before it was half-grown. The cause is now generally understood, and the little crescent mark, only a fifteenth of an inch long, is seen on every immature and fallen specimen. The insect makes the crescent-shaped incision, and inserts its egg, which hatches, and the larva cuts in toward the centre and destroys the value of the fruit. The peculiar habit of this little snout beetle, of folding its legs and dropping to the ground when shaken, renders its capture and destruction quite easy, by jarring down on stretched muslin sheets. The process is fully described, with illustrations, on page 233, vol. VI of Rural Affairs.

The most convenient mode for destroying curculios in orchards of moderate size, is represented in fig. 333. A piece of stout muslin, six or seven feet square, is stiffened by means of light wooden rods across two opposite sides, and these are kept apart by a cross rod through the middle. This rod is a little shorter than the breadth of the muslin, so that the latter assumes a slighlty concave form. The operator holds the sheet by

this cross rod as a handle, under one side of the tree, while with a heavy hammer in the other hand he strikes on the iron plug inserted in the branch on that side of the tree. The beetles drop on the sheet, which being held obliquely, they roll down to the concave part at the lower side, where they are quickly caught and destroyed by a single roll of the thumb over the finger.

Fig. 333.—*Simple Curculio Catcher.*

The simplicity and cheapness of this catcher are much in its favor. It is well adapted to trees so large as to need jarring on the two sides separately. It may be used on all trees, whether branching high or low, and the rough surface of the ground does not interfere with its operation. Unlike the contrivances for killing the insects in hot water or in oil, none but the curculios need be destroyed, the operator allowing lady bugs and other usefnl species to escape.

Another contrivance, for larger orchards, the invention of Edward Smith of Geneva, N. Y., consists of a similar hopper supported on legs (fig. 334.) A circular iron hoop about eight feet in diameter, has an opening on one side to receive the tree. This opening is closed around the tree by overlapping the ends. A tin cup at the bottom, holding several quarts, receives the dropping insects, which remain quiet so long as the hopper is kept moving from tree to tree. The iron-rod legs hang on the hoop, and being sharp at the bottom, stand firm when thrust into the soil. Two men carry it and work rapidly, or at the rate of three hundred trees in an hour. Like Dr. Hull's catcher, it requires a clean stem to the tree three feet above ground. When not in use, the legs are folded and it is hung up against the wall of the workshop or shed.

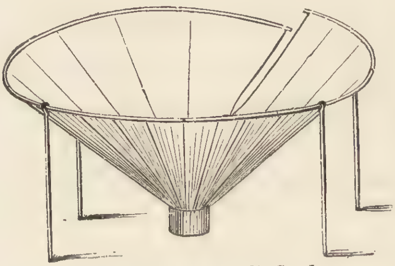

Fig. 334.—*Smith Curculio Catcher.*

One of the best forms of curculio catchers for extensive work, was described some years ago in the COUNTRY GENTLEMAN, by M. B. Bate-

ham, and stated by him to be a Michigan invention. It consists essentially of a large conical hopper set on a two-wheeled barrow (fig. 335.) The wheels are light and placed like those of a hand-cart. The hopper is made of oil-cloth, kept in shape by a light frame, and having an opening or slit on the forward side, to receive the stem of the tree as it is

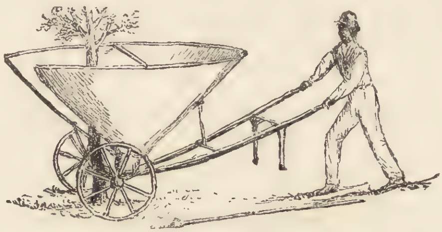

Fig. 335.—*Michigan Curculio Catcher.*

pushed foward. The oil-cloth being smooth, the insects slide freely down its surface, and the dew of morning does not wet and injure its working. At the bottom of the hopper a tin vessel is placed, containing kerosene or petroleum, into which the insects fall and are destroyed. This vessel is narrower at the mouth, the better to hold the liquid. The principal branches of the tree have small iron plugs set in them. The plugs are made by cutting up iron rods, about three-eighths of an inch in diameter, into pieces about four inches long, and they are inserted into holes bored an inch or so into the limbs with a breast-bit. A heavy hammer with a long handle enables the operator to strike a sharp blow, with a thrusting motion, on each of these iron plugs, while the hopper stands under the tree; the insects drop instantly, and are caught in the kerosene. This contrivance enables the operator to perform rapid and efficient work, and with a good sized hopper, a large orchard of plums, peaches or pears may be easily cleared each day of these destructive insects. One man, after some practice, can operate on three hundred trees in an hour. A little practice will enable him to judge how much oil to place in the vessel for each morning's catching.

Dr. Hull's curculio catcher (fig. 336) consisted of a broad, stiff hopper, covered with canvas, carried on a sort of wheelbarrow. The wheel was about three feet in diameter. The canvas was kept in shape on twelve arms or ribs, fastened to the solid frame of the barrow. The opening in front admitted the tree. A ram was attached to the front part of the frame, for jarring the tree. It was covered with leather stuffed with moss, to protect the bark of the tree from bruising. (It would have been more efficient if faced with a plate of cast-iron, to strike an iron plug inserted at the right height in the tree.) It is run against the tree three or four times, with sufficient force to jar down the insects, which are then

swept with a broom into pockets till they can be destroyed in hot water. To use this machine to advantage, the ground must be smooth, and the clear stems of the trees high enough to pass under. The largest size for

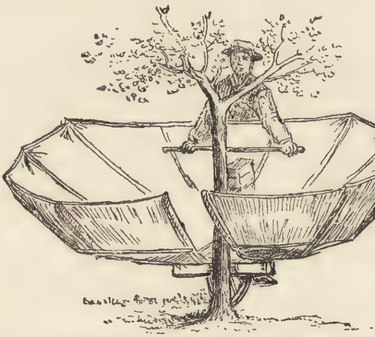

Fig. 336.—*Dr. Hull's Curculio Catcher.*

the hopper would be about ten by twelve feet. It was rather too cumbersome a machine for general use.

More recently the wheelbarrow was omitted, and the broad frame, covered with its stretched muslin, was strapped on the shoulders of a man who carried it, walking in the centre, and struck the tree with a hammer carried in his hand.

DESIGNS FOR CORN-CRIBS.

SEVERAL CORRESPONDENTS of the COUNTRY GENTLEMAN have given plans of corn-cribs which, in a condensed form for this work, may afford the reader valuable suggestions.

A New-Jersey correspondent gives the following:

I submit a plan of a corn-crib which I have recently finished, and which I find very convenient. It has all the facilities required in a crib. It can be filled direct from the wagon, and there are movable steps, or platforms, whereon to stand to fill the crib to the top. There is also a floor for shelling, which, when not in use, can be raised out of the way for loading. I give a drawing (fig. 337) of the frame of a single end bent. There are, as will be seen, two cribs, one on each side of the drive-way; each crib is 4 feet wide, outside measure, at the bottom, 6 feet at the top, and 10 feet high to the plate. This gives 50 square feet of section in each crib. With six bents, a crib 20 feet long can be had, giving 1,000 cubic feet, or a capacity for about 700 bushels of ears in each crib, when level

with the plate. The drive-way between the cribs is 8 feet wide, thus making the whole building 20 feet long, 16 feet wide, and 16 feet high from ground to peak of the roof. The crib is supported upon piers of

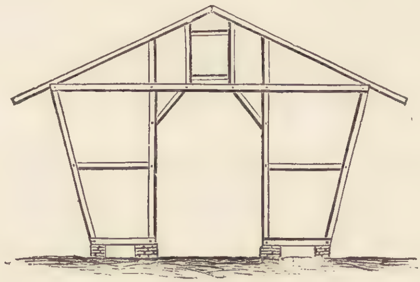

Fig. 337.—*Plan of Frame.*

brick, 8 inches square, under each bent. The frame is of 5-by-5-inch oak timber. The ends and sides of the crib are lathed up and down with 3-inch strips of oak, placed one-quarter of an inch apart.

The inside arrangement, however, is the unique part of the crib. There are movable beams of 3-by-4-inch stuff fitted across the drive-way, which rest upon the edges of the brick piers by which the bents are supported. These beams can be lifted out of their places and laid upon the ground beneath the cribs. A floor rests upon these beams. This floor is made of a series of five pairs of trap-doors (fig. 338) hinged to the posts of the bents, which doors turn up and hook to the sides of the cribs when the road-way is to be used. Each door is as wide as half the width of the road-way, (that is, 4 feet, or nearly,) and is made of matched boards placed lengthwise of the crib, fastened together by cleats. The ends of each door rest upon cleats fastened at each side of the cross-beams. The hinges fit into corresponding slots made in the posts of the bents. The doors, when raised and hooked to the sides of the crib, permit the floor beams to be removed. When the doors are down, they lie flush with the upper surfaces of the beams, and form a smooth floor, matched and jointed, upon which corn can be shelled and stored. Thus, when the crib is filled, there is a spacious room 8 by 20 feet, and 10 feet high in the middle.

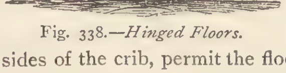

Fig. 338.—*Hinged Floors.*

To facilitate filling the crib from the wagons, there are cross-pieces bolted to the sides of the cribs in the wagon-way, and boards are placed upon these across the roadway from side to side. When the crib is

filled up to the lower loading doors, these are shut and bolted, and higher ones are opened, which are reached by the person standing upon the cross boards. This is shown at fig 338, where the movable floor beam with cleat on the side is seen at *a ;* the floor raised against the crib at *b;* the mounting board resting on the cleat at *c*, and the filling doors at *d d*. For convenience of procuring the corn from the crib for shelling, a number of sliding doors, *e*, fig. 338, are made near the floor, through which the ears may be taken with shovels and scoops when these are opened. The floors of the crib are made of matched hemlock boards. The whole cost of this crib was a little over $100. It ought to be stated that the drive-way of the corn-crib is closed at each end with double doors secured by locks. This crib I believe is vermin proof.


Fig. 339.

It might be well here to describe an arrangement which I once made in the side of a barn for the purpose of making a corn-crib in it. The crib was built in one corner of the barn for about 18 feet in length. The siding boards were removed and other narrow siding boards were placed horizontally, as shown at fig. 339, with short blocks one inch thick here and there, to keep the boards apart. Ample ventilation with perfect protection from the weather was secured in this way and the cost of an extra building was avoided.

Another correspondont (at Auburn, N. Y.,) furnishes the following design, with pig-pen and tool-house combined:

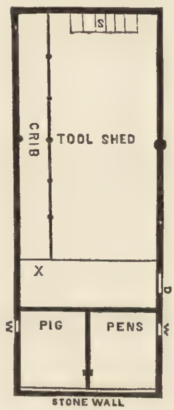

Fig. 340.

For a combined corn-house, pig-pen and tool-shed, I have never seen one that suited me so well. I have used it now two seasons, and it answers every purpose, and pleases all I show it to. To explain it I have drawn plans of the two floors. Fig. 340 shows the lower or basement, although it is all above ground, and fig. 341 the upper or second story. Mine is 18 by 48 feet, with posts 18 feet high, and gothic roof. It has 3-inch slats on sides, and matched pine boarding on ends, all thoroughly painted outside. It will hold fully 4,000 bushels of ears of corn. It can be built shorter or longer, to accommodate the quantity of corn wished to be stored. It is built near a side hill, so that by a little filling an easy roadway is obtained into the second story by teams, to unload corn, and it is long enough for two teams to unload at a time. Fig. 340 is the lower story, 7 or 8 feet high. In the end next to the wall I have a pen 16 by 18 feet, with alley, and the corn is handy to get at through a small door

into the crib at *X*. Small windows slide at each side, to give light and ventilation, and throw out manure from the pens. *D* is the outside door into feeding alley. The pen has a tight floor of matched pine, to save all the manure. I take a crib, as shown, off one side of the remainder of lower story, $3\frac{1}{2}$ feet wide, and leave the rest of the room open for a tool-shed, which gives a space for storing tools about 30 by $14\frac{1}{2}$ feet. *S* is the stairs to second floor, having a door that lifts up, as shown in second story (fig. 341.) The second story is floored with 2-inch matched pine, (except where the crib extends up from lower floor) and forms a threshing floor or drive-way, 10 by 48 feet, with a crib on each side 4 feet wide the entire length of the building. D D are double sliding doors to drive through, which fasten inside. *W W* are two windows to give light. The cribs extend nearly to the roof, and are $4\frac{1}{2}$ feet wide at top. The door at the top of the stairs is shown at fig. 342, and is made strong enough to support the weight of a team which may be driven upon that floor. I find this a capital place to cure my beans, which ripen early enough to thresh and get out of the way before corn is ready to husk; and being so high from the ground, the corn cures quicker and more perfectly than in cribs near the ground.

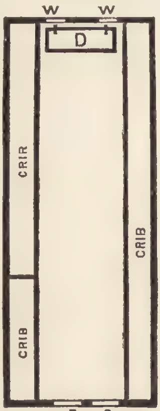

Fig. 341.

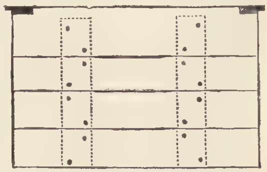
Fig. 342.

A farmer in Missouri has adopted the following plan:

The drawing (fig. 343) shows the gable; a crib 6 feet wide on either side; wagon shed 10 feet wide between, and an oat bin or workshop 7 feet wide on the floor overhead. The right-hand half shows the finished building; the left-hand the frame. The foundation is of broken stone well rammed into a hole 2 feet square and 3 feet deep, upon which white oak blocks, faced over the outside and beveled on the inside to the width of the sill, are placed. The sills are of oak, 8 by 9 inches; posts 8 by 8 inches; plates and stringers, 4 by 6; tie-beams, 6 by 8; joists for cribs and overhead, 2 by 8; rafters, 2 by 4, tapered to 2 by 2; braces and collar beams, 2 by 4, and laths for cribs 1 by 5 inches. Floors of matched and dressed pine. The outside posts are 10 feet 4 inches in length, tenoned at each end for the sill and plate. The inside posts are 10 feet in length, tenoned for the sill, and having an 8-inch slot at the top for the tie-beam, and also morticed for stringers in front of cribs.

By making these cribs 30 feet long, room will be secured for 3,000 bushels of ears, and cover for two wagons, with bins for 600 bushels of

oats. The crib posts should be $7\frac{1}{2}$ feet from centre to centre, and upon the inside, doors may be hung for filling. When full to the bottom of the doors, close them and throw corn over the upper stringer. The laths

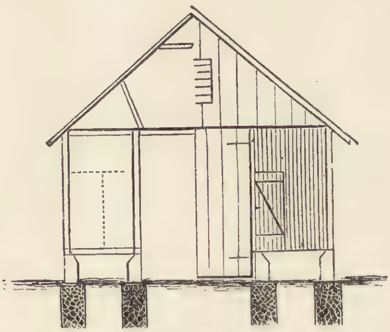

Fig. 343.—*A Missouri Corn-Crib.*

should be 5 inches wide, so that rats cannot climb them. The outside posts should be covered with a board of the same width. The crib joists should be let into the sills, so that the floor may lie tight on the sill. The oat bins should be sided up on the inside of the slanting braces, lapping like the siding of a house. A place for shelling is made by cutting off the end of either crib with a temporary partition.

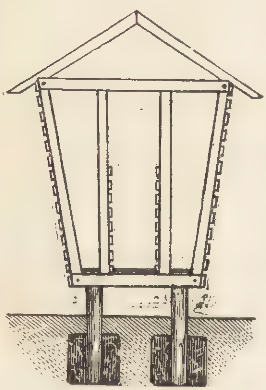

Fig. 344.

The following was furnished by a correspondent at Oneida Lake, N. Y.:

My experience has taught me that corn in too wide a crib will not keep without moulding in wet seasons. Twenty-five years ago, in buying a farm, I came into possession of a crib 4 feet wide at the bottom, and flaring to 6 feet 6 inches at the top. After losing some corn from mould, I furrowed it out, and made it of the shape illustrated in the accompanying sketch (fig. 344). I am to-day building and putting up a new one of the dimensions and form of the illustration. The passage-way is wide and high enough for a man to carry a bushel basket of corn on his shoulder. The slats in the passage-way are left open at the top to within 3 feet 6 inches of the floor, between the second and third beams from each end, the crib being 32 feet long. Temporary

slats with a small cleat three-quarters of an inch wide at each end, are let into the grooves formed by the ends of the permanent upper slats, and a cleat is nailed on the inside part, so that the crib can be filled full from end to end. The floor is of hemlock plank, 2 inches thick, and the longitudinal joints are left half an inch apart.

Twenty odd years ago I had some trouble from the heaving of the posts by the frost. I thought out a plan of fixing them permanently by grouting them, and succeeded perfectly. I grout all my gate posts, and my cheese-curing room stands on posts 3 feet 6 inches above ground, grouted, and I am never troubled with rats or mice. The holes should be dug out a little larger at the bottom than the top, and never smaller. The grouting is done thus: Cut a kerosene barrel into two parts for a tub to mix in; then take one peck of water lime and two pecks of clean coarse sand—the coarser the better—and put them into the tub, and with a shovel mix them together dry. Then add water and stir thoroughly till the grout is of the consistency of thick cream. Then throw into the hole clean coarse gravel enough to fill it up 3 inches deep; stir the grout quickly, and tip it into the hole, on top of the gravel. With a spade, chop and stir up the gravel, so that the grout and gravel will be thoroughly mixed, and keep adding gravel and working them together till that batch of grout is all used up. Keep mixing and grouting till the hole is filled to within 4 inches of the surface, and fill up to the top of the ground with earth trodden down firm. One barrel of lime will make grout enough for four holes—costing me at the works less than a dollar a barrel. Never mix more than two parts of sand to one of lime, if you want a solid job.

The timber in the crib is as follows: Sills of hard maple, 6 feet 6 inches long, 4 by 4 inches; plates of same, 7 feet 6 inches long, 4 by 4 inches; outside posts of hemlock (flaring 6 inches), 4 by 4 inches; inside posts, hemlock, upright, 7 feet 2 inches high between shoulders, and 4 by 4 inches; inside, 2 feet 4 inches apart for passage-way; slats, 16 feet long, 5 by 1 inch, and ¾ of an inch apart, put on horizontally; foundation posts of cedar, 6 inches diameter, 3 feet in the ground, 2 feet 6 inches out. Grout holes, 3 feet deep and 2 feet square, filled within 4 inches of the top of the ground. The posts and bents are 5 feet 4 inches apart from centre to centre. Length of crib, 32 feet, or 48 feet if wished for. Projection of eaves of roof, 12 inches.

Greenhouses in Severe Weather.—The most difficult time to maintain warmth in glass structures is during the prevalence of high winds that penetrate every crevice between the glass. In ordinary times these cracks are stopped by the congealed moisture, but a driving wind keeps them open. A little water thrown on these places at such times will usually freeze tight in a moment and prevent a great loss of warmth. The application may have to be repeated as night returns.

OTHER SUGGESTIONS ABOUT BUILDING.

Dampness in Foundation Walls.

THE FOLLOWING ARTICLE is copied from a work entitled "Foundations and Foundation Walls," by George T. Powell, published by Bicknell & Comstock of New-York:

In dwellings that are isolated, to avoid dampness from penetrating the basement or cellar walls that are below the line of earth, architects sometimes specify that the outside of the walls be cemented from the footings to the baseboard of framework, or base line of stone moulding, and in some instances stop the cement 4 to 6 inches below the line of earth. Then excavate the earth around the structure to the distance of 2 feet from the wall, and to a depth of 16 to 20 inches, and at an angle of 10 degrees lay one course of brick flat up to wall line, and cover with a coat of cement, as shown in fig. 345. Before this is done, it is necessary to fill in earth

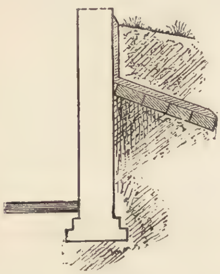

Fig. 345.

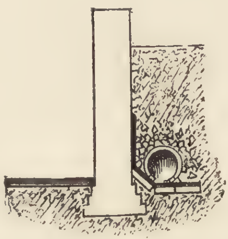

Fig. 346.

and settle it around the walls. After this is done, allow it to set perfectly before covering with earth. As the foregoing method interferes with flowers and grasses up to the line of wall, here is another method (see fig. 346).

After the wall has been built and cemented on the outside (Rosendale cement is good enough), excavate the earth on the outside to line of footings, fill with firm earth to top of footings, and grade the excavation to a proper descent to carry the water to sewer in a drain pipe laid on top of a course of bricks cemented, and on top of this put loosely broken stone, and cover the whole over with earth when it is dry. Where there is a clay bottom and much moisture, even this will not prevent dampness from arising in the cellar. To overcome this, use the method shown in fig. 346 on the outside, and that of fig. 347 on the inside.

Prepare the cellar bottom, and lay say 3 to 4 inches of sand, rolled down firm and even. On top of this put a coat of cement $1\frac{1}{2}$ inches thick, over

the whole surface of the cellar, and lay off, around the cellar walls in the cement, flat gutters of slight descent to the sewer or waste-pipe.

There are clay soils sufficiently solid for walls of dwelling-houses. But the clay in wet seasons retains so much moisture that it does not seem to be carried away into the earth, but rises and penetrates through the cellar bottom, and keeps the cellar damp nearly all the time. This is a serious difficulty to overcome, but I have known the following method to be carried out with success: Excavate the foundations to the depth required

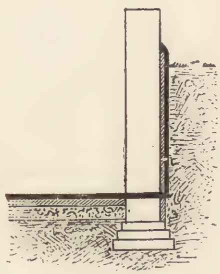

Fig. 347.

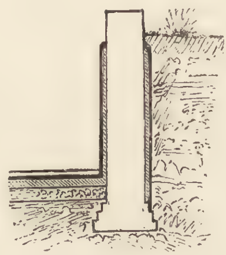

Fig. 348.

to put in the footings, and in the cellar bottom 4 to 5 inches of sand rolled hard, on top of which lay a coat of cement not less than one inch thick; and when this is as dry as possible, put a coat of asphaltum over the whole surface up to the lines of the inside walls, and through one course of brick around the whole structure, as shown in fig. 347, care being taken to cement the outside wall, and coat it with asphaltum, same as the cellar floor. This is the best course to pursue where there is no chance for a drain.

Another method to secure a dry cellar is as follows (see fig. 348): Perform such levelling to the cellar bottom as may be required; spread over this, sand to the depth of 3 to 5 inches, and roll or pack firm; on top of this cover the whole surface with one-inch thickness of cement mortar, Rosendale or American brands; carry it well against the inside of the outer walls. Coat the outside walls with cement one-half to three-quarters of an inch thick in the same manner, up to dry line. Then on top of this lay a coating of asphaltum, tar and sand, applied hot; carry the asphaltum through the wall—see fig. 347—(this should be provided for when the foundation walls are being built), and coat the outside wall to dry line with hot asphalt. When the asphalt is sufficiently dry to walk on, dip heated brick into asphalt and tar, and lay closely the whole surface with brickwork. When it is not possible to carry the asphalt through the wall to the outside, carry it up on the cement on the inside, as in fig. 348.

The best mixture of asphalt is to mix with the asphalt 10 per cent. of coal tar and 25 per cent. of sand, and use while hot, to form a cement for bedding brick for damp cellar bottoms.

A Cheap Greenhouse.

We have taken pains to examine some structures erected and in operation, and have selected one, of which we give a detailed description, and which seems to combine cheapness and efficiency. It is quite small—only 13 by 16 feet—but admitting of any degree of extension; and those who copy the plan will doubtless see various points where they may make alterations if not improvements. The entire cost of this structure was but a little over $100. A plan is shown in fig. 349.

The outside walls are made of horizontal inch boards, nailed on posts set in the ground, and without sills. The posts being about 4 or 5 inches thick, leaves a space between the two board walls, which is filled with sawdust. The roof consists of sash 7 feet long, the bars 2 by 1¼ inches, set with lapped panes 8 by 10 inches. The section is shown in fig. 350. Fig. 351 shows the construction of the ventilators at the peak. There are three ventilators, each 6 inches wide and 3 feet long, turning on pivots at the ends, as shown in fig. 351. Additional ventilation may be given by opening the doors at the ends. The eaves are 4½ feet above the ground; the peak 3½ feet higher.

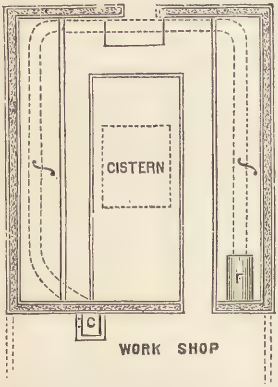

Fig. 349.—F, *furnace*; f f, *flues*; C, *chimney*.

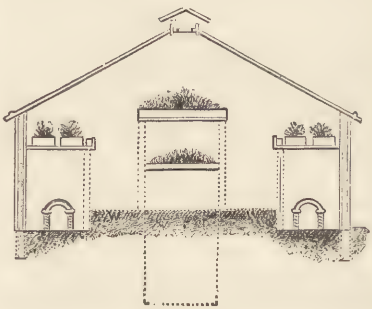

Fig. 350.

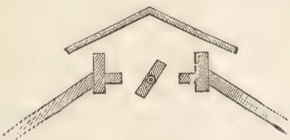

Fig. 351.—*Ventilator at Peak.*

The building is heated with a coal furnace, which is simply a box-stove three feet long and about one foot square, with grate bottom and ash-pit below. This furnace is set in a depression dug in the earth. Some better form than a box-stove might probably be chosen. From the furnace a horizontal brick flue extends around the interior of the building, as shown by the dotted lines in fig. 349, and beneath the shelves in the cross-section, in fig. 350. This flue is made of bricks on

edge, capped with semi-circular or semi-tubular tiles, and its interior is about seven inches wide and one foot high. It gradually rises several inches in passing around to the chimney. The cistern beneath the central shelves is shown in the cross-section, fig. 350, by tne dotted lines beneath the central shelves.

The side shelves (fig. 352) are 3 feet wide, and extend the length of the building. They are about 3 feet above the walk (shown in fig. 350), and the plants are grown in boxes placed on them. The central shelves, one above the other, are $3\frac{1}{2}$ feet wide and $11\frac{1}{2}$ feet long.

Fig. 352.—*Cross-Section of Side-Shelf.*

A small quantity of fuel is sufficient to keep up the necessary temperature. The building is placed where it is well sheltered from the winds by evergreen trees, but not shaded. With a double roof like this, it would not answer in a windy place. Where a lean-to would be preferable, the same mode of construction might be employed, with one-half the interior arrangement.

We are assured by the owner that less attendance is required for this small greenhouse than for an ordinary hot-bed. It is mostly employed for starting young plants of tomatoes, cabbages, lettuce, celery, &c., the seeds of which are mostly sown in February. It is also used for keeping half-tender roots and bulbs. In summer and autumn it is employed for drying fruits of various kinds, the warmth of the sun through the glass increasing the natural heat of the air, and there is no necessity for guarding against sudden showers of rain, as when fruit is dried in open air.

An Ice-House with a Cool Room.

An ice-house cannot be kept free from dampness. Its coldness naturally gathers moisture in warm weather, and whatever there is about it will always be mouldy, and have an earthy or disagreeable smell. By some very well constructed arrangement, an ice-house and cool room may be constructed so as to be effective and agreeable, but it will be at the cost of a large expenditure of ice.

An ice-house and closet may be constructed as follows: Excavate a half cellar in a perfectly dry place, from which the surface slopes (or may be made to slope) in all directions, so as to prevent any danger of moisture from want of drainage. A stone or brick wall is built around this, and laid in hydraulic cement. The floor is cemented. A frame or other building is built upon this basement to contain the ice. The size may be made to suit the circumstances. Twelve feet square will be large enough for a moderate sized family, as an ice-house of that size will hold about twenty loads or tons of ice. The ice-house may be built in such a manner as is described and illustrated in many places in the volumes of Rural Affairs.

The main point is the division between the ice-house and the room

below it. This must be perfectly air-tight, and a moderately good conductor of heat. The floor may be laid in the following manner:

Beams of sufficient strength are laid across, and the ends well bedded in cement. A floor of zinc sheets is then laid upon the beams, the sheets being closely nailed to the beams upon strips of rubber sheeting, to make the joints water and air tight. The beams should be dressed smoothly. The zinc sheets are bent, as shown in the illustration, fig. 353. This is for the purpose of causing the dew or moisture, which will condense upon the under side of this ceiling, to flow downward to the lower angle, where it will drip. The drip is caught in the little gutters of zinc shown in the figure, attached to the ceiling, and is carried off by a proper drain. With this water will also be carried off much of the impurity of the atmosphere, and if very little ventilation is given, there will be little condensation, and the air will be kept dry. This point must be well attended to, as the danger of excessive ventilation is very great. The beams and zinc ceiling should be painted with white paint—lead and oil.

Fig. 353.—*Ceiling of Cool Room.*

Above the zinc ceiling, a thin layer of dry, fresh sawdust should be laid smoothly, and a floor of matched pine boards should be laid upon that, and thoroughly coated with melted pitch. This floor should slope a little to one corner, so as to draw the waste water from the ice there, and an S trap drain should be laid from that to carry off the water into

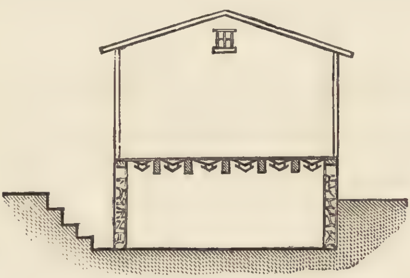

Fig. 354.—*Ice-House and Cool Room.*

the drain before mentioned. The usual layer of sawdust is laid upon this floor to prevent too rapid conveyance of heat from below to the ice above. Small double windows should be used in the cool chamber below. to prevent access of heat from the outside, and they should be fitted air-tight. Ventilation should be provided for by means of a wooden pipe with a slide, by which the opening can be regulated. By carefully regulating the ventilation, the air may be kept dry and sweet; but if too much outside air is given, the chamber will become damp and mouldy. A section of the whole building is given in fig. 354.

A Convenient Piggery.

The following article was written for the Country Gentleman by an Orange County, N. Y., farmer:

The size of the building is 26 by 40 feet, and the general arrangements can be seen by the accompanying plan. The building is two stories high; the front posts are 16 feet high; rear posts, 14 feet, and it is covered with a gravel roof. The first floor (fig. 355) is divided into five pens, 8 by 14 feet,

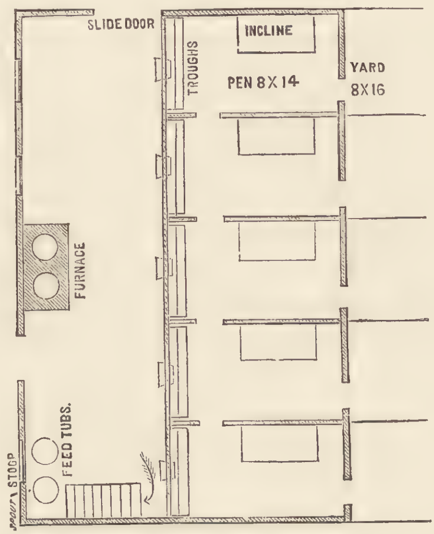

Fig. 355.—*First Story of Piggery.*

6 feet high, to be used for feeding-rooms. There is a killing-room under the whole building, with floor laid with swelled brick in cement, having a gradual fall from the sides to the centre of the room, and thence to the outer door to carry off all waste water. The furnace and feed troughs are of iron; the troughs are 1 by $7\frac{1}{2}$ feet. The spouts are of iron also, bolted to the troughs at the lower end, and are 2 feet long, 16 inches wide and 3 inches deep. The feeding-room floor has a fall of 4 inches in 14 feet, toward the back sill, discharging under the sill. The sill stands on iron points 4 inches high.

The second story (fig. 356) contains five sleeping rooms, reached by inclined walks from the feeding-rooms below, and are floored with $1\frac{1}{2}$-inch oak plank, laid on 6-by-6-inch chestnut beams. The store-room and platform are floored with $1\frac{1}{2}$-inch spruce plank, matched, with feed-bin and

spout of same material, to carry feed to the milk-tubs below, as may be seen by the plans. Each sleeping-room is well lighted, and the height of this story, with windows open in warm weather, affords ample ventilation, keeping the animals in better condition than would be the case in a dark, badly ventilated pen.

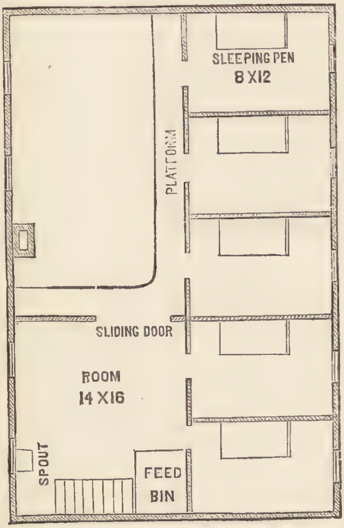

Fig. 356.—*Second Story.*

The pens can all be opened into one, or kept separate by sliding-doors, worked by pulleys and cords from the killing-room, and this will be found very convenient in dividing off the different lots of hogs. A door from the centre pen to the killing-room will be found a great convenience on slaughtering days. The yards are 8 by 16 feet, and floored with swelled brick laid in cement, with a fall of one inch to the foot, with a tight wall, which is calculated to hold the water, and make room for coarse litter for the making of manure. The open space shown in the diagram of the second floor (fig. 356) is used for slaughtering and hoisting cattle as well as swine. I am wintering 20 hogs, and they are doing well. I find no difficulty in getting my hogs to occupy the sleeping-rooms.

Plan of a Cattle Barn.

I enclose you a plan (fig. 357) of a cattle barn which I think will recommend itself to farmers who want a cheap and substantial barn. It is built without any sills, the upright posts being simply set on small rock pillars. *G G G* are grain bins; *F*, feed room; *T*, turn table; *R R*, track for feed car; *S S*, stables, 11 by 33 feet.

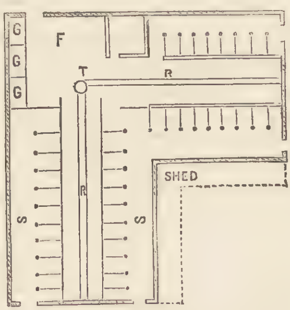

Fig. 357.—*Plan of Cattle Barn.*

It will be seen by fig. 358 that by bracing the intermediate spans of the frame with one-inch iron rods, and with a plank nailed on for a collar

beam between the rafters, there will be no cross-girders in the hay-mow to be in the way of handling hay, either by hand or hay-fork. Fig. 359

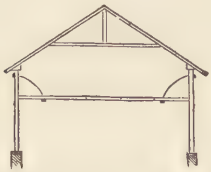

Fig. 358.—*Intermediate Spans with Braces.*

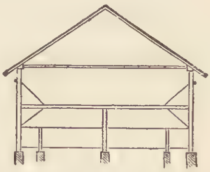

Fig. 359.—*End of Frame; Posts 14 feet.*

shows the frame at one end. There is no use of having a large covered space to drive a wagon in to unload, when it can be done as well from without.—*Virginia correspondent of Country Gentleman.*

THE REARING AND KEEPING OF RABBITS.

By Henry Stewart, Bergen County, N. J.

RABBITS MAY BE REARED as cheaply as fowls, and the flesh is equally desirable as food; they are also equally entertaining as a source of pleasure for fanciers, both old and young, but more especially for young people. The possession of a pair, or a few pairs, of rabbits, and the entertainment to be derived from the care of them, may very easily become the foundation of a tie which may firmly bind a youth to the family homestead, and turn him into an ardent lover of his fathers' rural pursuits. A love of animals is one of the indispensable qualifications of a successful stock breeder, and many of those men who have become prominent in this way, and have given a controlling direction to some remarkably successful lines of breeding, have begun their career as breeders of such pet animals as rabbits. From rabbits they have advanced to Short-Horns, and have made their mark in every step of their career. It is therefore for the boys more especially, and not for the grown-up fancier, that these lines are written.

In beginning to keep rabbits, one should avoid the mistake of attempting to rear the rarer and more expensive, as well as the less hardy varieties. With a costly pair of lop-ears one will want a fancy hutch, and will almost invariably kill his pets with kindness, and when the almost unavoidable failure comes, the disappointment will be the keener. The common grey or black and white rabbits, can be procured cheaply, and a hutch made of a few boards and laths will be a cheap and yet sufficient lodging. When these can be kept successfully, all the difficulties conquered, and a good stock of experience has

been gained, then, but not before, the stock may be increased, and the more desirable varieties kept.

In selecting rabbits, those about six months old should be procured, and kept for three or four months before they are paired. Young rabbits are to be known by the short claws, which do not project beyond the fur of the foot, and by the small teeth. A healthy animal is known by the clearness and the pure white color of the eye. The appearance of a yellow tinge to the white portion, with a swollen or pot belly, are signs of bilious disorder and deranged liver, which is the most frequent and dreaded disease. This is caused by over-feeding on soft, wet food. In good health the droppings are in round balls, having no disagreeable odor when fresh, and the animal is lively and sprightly. Three does and one buck are a safe number to begin with, although six or eight does may be mated with a single buck.

The essentials in rearing and keeping rabbits are warmth, dryness, good food in moderation, and perfect cleanliness of the lodging. The following rules for the government of a flock, small or large, are to be observed:

Maintain the greatest quiet in every particular.

Have no dogs about the pens.

Never disturb the rabbits at mid-day.

Keep regular hours of feeding and times for cleaning.

Never permit any offensive odor in the pens.

Watch carefully for anything wrong, and look to it at once, and separate any sick animal from the others.

Examine often the noses; eyes; ears, inside and out, and the feet, for anything wrong.

Ventilate the hutches and pens thoroughly.

Keep the temperature equal and comfortable.

Keep nursing does always supplied with food.

A doe that has reared a large litter should not be bred again so soon; frequent litters make weak stock.

Never handle the young rabbits.

Permit no mice or rats about the pens.

Use little or no green food when getting the rabbits into condition.

Never feed green food when it is wet.

Avoid exposure to damp and foggy weather.

Study the nature and character of the rabbits, and know the reason for every point in their management.

Varieties of Rabbits.

We have no wild rabbits in America. Our rabbit is a hare; all our domesticated varieties are therefore imported. The most hardy of all these is the common black and white or Dutch rabbit (fig. 360). This is the smallest variety, but is preferred for table use to some larger kinds,

on account of the quality of its flesh. Although usually black and white, yet its principal color is sometimes grey, slate color, yellowish or brindle,

Fig. 360.—*Black and White Rabbit.*

mixed with white. The white is in a ring around the neck, a streak up the face, and on the tip of each foot. These markings are considered as the standard, but the colors vary from nearly all white to nearly all blue, yellowish or tortoise shell, or brindled, or patches of these shades. The does of this variety are excellent mothers, and will foster and rear young ones not their own without the least objection, and being good feeders, can take care of a large litter without any trouble. They produce from five to seven young at a litter, and when full grown will weigh from 3 to 5 pounds.

The lop-eared rabbit (fig. 361) is the most popular of all varieties; some perfect specimens bring enormous prices, as much as $100 having

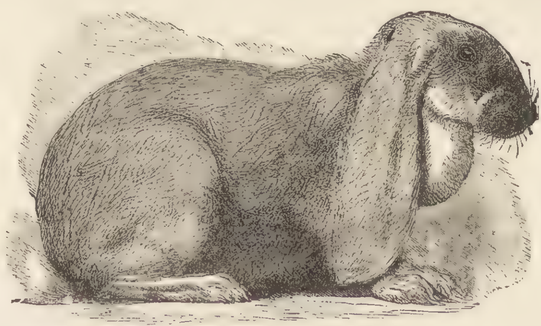

Fig. 361.—*Lop-eared Rabbit.*

occasionally been paid by English fanciers. It is remarkable for the length of its ear, which sometimes reaches 21 or 22 inches. In color this variety differs greatly; in fact it may be said to be of all colors, for it is

grey and white, black and white, blue and white, yellow and white, grey, fawn, black, white, and mixtures and shades of these colors. Tortoise shell is a favorite and somewhat rare color. The lop-eared is a large rabbit, weighing when in good condition 10 to 12 pounds, or even more, and requires good feeding. Sweet, fresh hay, oats, rutabagas, scalded bran, peas and crushed corn form the best kinds of food. They also require a good deal of warmth, and when kept in a convenient court a small stove will be indispensable in the winter to maintain them in the best condition. The ears are enlarged by frequent manipulation with the fingers and thumbs, and a fancier who can, by pulling and stretching the ears, and keeping the animals in excessively warm pens, add so much as half an inch in length and width to these appendages, will consider himself as unusually fortunate.

The silver-grey rabbit (fig. 362) is of Asiatic origin, and said to have come from Siam. It is certain that these animals are very largely kept

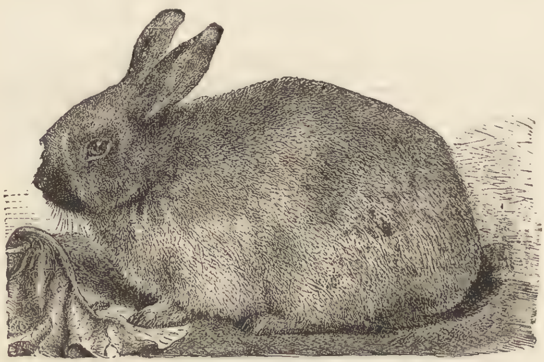

Fig. 362.—*Silver-grey Rabbit.*

in that part of Asia, where they are used in the pagan ceremonies as sacrifices to propitiate the deities who are supposed to look after the harvests, and induce them to make the crops as prolific as rabbits.

This variety is large and unusually heavy, reaching from 6 to 9 pounds, and is more solid and plump than any other rabbit of its size. The young are black at first, but as they grow older, white hairs appear mingled with the black until, at maturity, the solid silver-grey covers the whole body, except at the tip of the nose. Thousands of this kind of rabbit are reared in a wild state in the open ground in England for market, and for their skins. The flesh is very well flavored, and the best colored skins are in demand for the kind of fur known as "chinchilla," or when dyed, for other more pretentious and costly kinds. It is the best variety for profit, and is hardy and prolific, but shy and not very docile.

The Belgian hare-rabbit (fig. 363) is the largest variety known; it reaches a weight of 10 or 12 pounds when fattened, and is kept chiefly by French

Fig. 363.—*Belgian Hare-Rabbit.*

fanciers. A few fine specimens of this variety are sometimes found on board of the French and German ships in New-York harbor, upon which they are kept as pets by the sailors. They are hardy, and may be kept in a dry locality out of doors in a half wild state with great success and very cheaply, if furnished with warm winter quarters. They are easily kept, are excellent feeders, are docile and not pugnacious, although timid, and are alarmed even by a mouse. In color it is of a solid reddish grey, and its fur is valued by the furriers. It is hardy, and will thrive in a lower temperature than either of the two varieties last mentioned.

The Himalayan or Chinese rabbit (fig. 364) is a beautiful little animal, being mostly pure white, excepting on the ears, the tip of the nose and

Fig. 364.—*Himalayan Rabbit.*

the feet, which are black. The young at first are wholly pure white, and take on the black points only when five months old. They weigh about

five pounds when fully grown and fat. A warm pen must be provided, as they are tender, and cannot stand severe cold, but they are not difficult to rear if precautions are taken to protect them from sudden changes, and provide them with warm pens and nests.

There are several other varieties known to fanciers. The so-called Patagonian, a cream-colored rabbit from Savoy, is very large, some castrated males reaching 12 pounds or over when ready for market. The Angora, like the goat of the same nativity, has long, silky fur, which has to be combed to keep it in good order; the color is most often pure white, but mixed and self colors of all shades of black, grey, fawn and blue are occasionally found, and by crossing, the mixture is still further varied.

The common rabbit, which is of all sizes, shapes and colors, is the most frequently met with. It is a cross breed in which the most common varieties have been mingled until it has no distinctive mark. But although common in every respect, it is far from useless, because it is the best kind to begin with, and a pair may often be procured for such a moderate sum as to be within the means of almost any country boy who has the most meagre supply of pocket money.

The Management of Rabbits

Varies with the manner in which they are kept. The most hardy kinds may be kept out of doors the whole year, and indeed any variety may be kept in open courts in mild weather, if warm shelter is provided during storms. The court may be an oblong yard, and as rabbits are burrowing animals, it should be paved with cobble stones or covered with a floor. The pens are arranged around the sides in the manner shown at fig. 365. A range of pens for does (*C C*) is made on two sides, the pens for the bucks, *D*, are at the end. The door is at *B*, and at *A* is a mound of earth over some rocks so arranged as to make cool burrows for the rabbits during the hot weather. This earth will be serviceable in cleaning the feet and fur, and absorbing all the odors coming from the animals. At *Z* is the feed trough, covered with wires, to prevent the rabbits from getting into it and wasting the food.

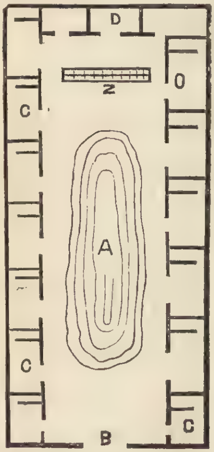

Fig. 365.—*Rabbit Yard.*

An excellent court may be made of a sandy hillside having a southern exposure, in a piece of open woods or shrubbery surrounded by a tight board fence, and having a covered range of pens in the centre. The hardy kinds might be kept here in a half wild condition, and be permitted to burrow in the bank, as is natural to them.

The breeding pens have a retired corner partitioned off, where the does may make their nests, and the pens should have hinged covers, that may be raised for the purpose of cleaning them when required. The pens (fig. 366) may be made of cheap dry-goods boxes raised on short posts to avoid dampness. A door is cut in the front and fitted on a pin, so that it may be turned around until it rests upon a screw as shown. A door is made to open into the nest apartment, hung upon hinges and fastened with a button. The partition is made to slide in or out, and a small knob is screwed on the edge to hold it by. The pen should be about 3 feet long and 2 feet wide and high. Shoe boxes will do very well for small rabbits, but larger boxes are required for the larger kinds.

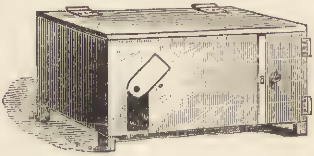

Fig. 366.—*Rabbit Pen.*

For an indoor court a stable floor or stall may be used. The pens are then ranged one above the other—the first ranged upon 9-inch posts, and the others with posts 4 inches long. The floors are kept littered with chaff or sawdust, or dry sand, and if the rabbits are fed upon dry food, they will make very little dampness. A false floor of laths nailed upon half-inch strips makes a good dry floor. Double pens, or rather two tiers of double pens, for rabbits not breeding, are shown in fig. 367. A breeding pen provided with a false floor and a wire door is shown in fig. 368. The door of the nest apartment is not shown so that the slide partition may be seen. The last two are suitable for indoor use. Out-door pens should be tightly roofed, to shed rain, and the water should be carried off.

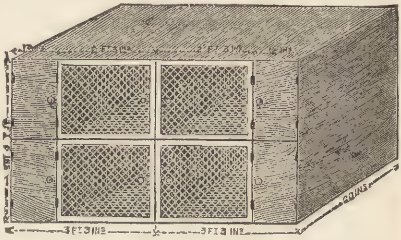

Fig. 367.—*Double Pen.*

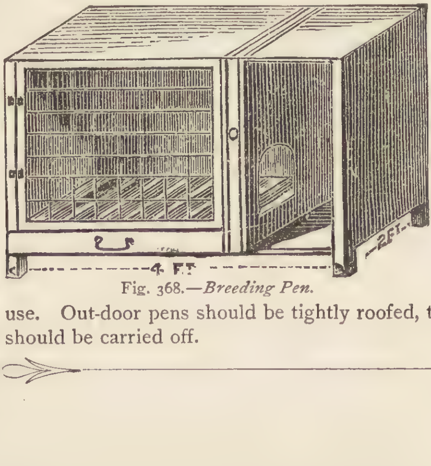

Fig. 368.—*Breeding Pen.*

Feeding and Breeding.

Soft, short oat straw or chaff, or pine sawdust is the best bed. Clean oat straw will be eaten very readily, and the refuse will serve for litter. The feed should consist of some sliced rutabaga, carrot or cabbage in the morning; whole oats or crushed corn will make the evening feed for full grown animals. Young rabbits require crushed oats and bran, or ground oats and bran as usually used for horse feed. Sweet, fine meadow hay, dried lawn clippings, or clover, may also be provided for them. Peas or corn steeped in water and the water poured off are good food for fattening, and two tablespoonfuls a day will be sufficient for a full grown rabbit. In cold weather a supper of thick corn-meal mush, given warm, but not hot, will be beneficial; barley and cut potatoes boiled dry and mixed with corn meal or linseed meal, may be given for a change. Drained, fresh brewers' grains are also healthful food given at intervals. The feed should be given three times a day, and only so much as will be eaten clean. A pinch of sulphur and salt should be given once a week. A bed of chiccory may be grown for them, and dandelions are also useful. Very little water is needed, but if some is offered once a week, a sip or too may be taken. A little warm, sweet milk is very acceptable to them, but the dish should be removed as soon as they have taken what they wish. For feeding rabbits in pens indoors, the small flower-pot saucers make very good dishes, not being easily upset, and are easy to clean. Hay may be given on the floor or in small racks tacked to the sides of the pens.

Rabbits should be paired first in February or March. The does should not be bred until five or six months old, and four litters in a year are as much as should be raised. The buck should not be left with the doe at coupling for more than a few minutes. When the doe is about to litter, she will begin to make a nest by carrying hay and straw to a corner of the pen. When this is seen, the pen should be at once thoroughly cleaned and disinfected with a little chloride of lime or diluted carbolic acid, and then sprinkled with fine sawdust. The dates of littering may be known by adding thirty days to the record of coupling. The day before littering a dish of fresh water should be given to the doe, and this will prevent the killing of the young, which is said to be caused by the intense thirst experienced at this time.

No dogs or strangers should be permitted near the pens, and every movement should be so quiet as not to startle the doe, which is now very excitable. The young rabbits should never be touched. If any die, the doe will bring them to the door of the pen. Nursing does should have warm milk and bread given liberally morning and evening for the first three weeks; after that, carrots cut into slices, and thick corn mush, and soaked—but drained—peas may be given. After fifteen days the young rabbits may be seen peeping out of the nest, and in three weeks should be removed to a clean, warm pen. A spare pen or two should always be

kept in readiness for this purpose. A few Dutch does will be found useful in large collections to foster surplus young ones, and to save the litters of weak does. When fine specimens are desired, all the young but two may be taken from the mother. When a month old the young will leave the nest and will begin to feed with the dam. After two to four weeks more they may be removed, one at a time, so as to dry up the milk gradually. A little salt may be given to help dry the milk. After they are four months old, the young rabbits will begin to quarrel and fight, and should be separated, the bucks being put into separate pens, and the does left four or six together, until ready for breeding.

At eight weeks old the young rabbits moult, and then require a little extra care. Some crushed oats, fresh carrots, and plenty of fresh, but not cold, air should be given at this time. Young growing rabbits will eat constantly, and should be provided for liberally. By carefully observing them, their habits will soon be learned, and all their necessities soon discovered. Prompt attention should then be given.

PROFITABLE ORCHARDING.

WE FURNISH THE READERS of RURAL AFFAIRS with an account, from personal examination in the autumn of 1880, of a number of apple, pear and peach orchards, which have proved profitable to the owners, and in some instances eminently so. Citing these successful instances may be objected to as furnishing rare exceptional cases, and as not affording a fair statement of the average results from orchards throughout the country. It is true that they are rare instances; but the skill and care with which they were managed are equally rare. In all our examinations we have not seen an orchard of good bearing age, in a favorable locality, with good soil, well selected varieties, and managed with skill in culture, care in gathering and packing, and with intelligence in marketing, that did not give its owner very profitable returns. Most of the orchards throughout the country receive comparatively little attention, and they are often planted in places badly adapted to the best success. From such orchards favorable reports are not to be expected.

MR. CHAPIN'S ORCHARD.

We had occasion to notice in former years the apple orchard of OLIVER C. CHAPIN of Ontario county, N. Y., and on account of its extent, much interest has been felt by the public to know the degree of success which has attended it. During a recent visit at Mr. Chapin's place, we obtained information as to its profits up to the present date, Mr. C.

and his son, Harry Chapin, affording us all the facilities required for a thorough examination of the orchard, as well as the figures from their note books.

The planting of the trees was begun in 1851, and was continued for eleven years, their present age ranging from 18 to 29 years, and the

Fig. 369.—*A Small Portion of Mr. Chapin's Orchard.*

majority being about 22 years old. There are nearly 6,000 trees, covering 125 acres. Most of these are Baldwins. Besides these there are about 10 acres of an old orchard, the whole covering more than one-half of the 240 acres of the farm. The trees are planted 30 feet apart, and they have now grown so that the branches in opposite rows nearly meet each other.

This orchard, although in one entire piece, is divided into three or four portions by partition fences, for the sake of convenience in cultivation and for pasturage.

For the first ten years or more the ground was cultivated without cropping—that is, it was summer-fallowed. Crops could have been taken if

Fig. 370.—*View of a part of Mr. Chapin's Orchard seen a Mile Distant.*

there had been manure to meet this increased demand. Of late years the treatment has been seeding to clover, feeding this down by sheep,

plowing it under in three or four years, and top-dressing with manure as far as practicable. The ripening of some of the seed under the tread of the sheep keeps the clover crop growing for some years. This treatment has effected a visible improvement in the appearance of the trees of late years, and they have become more thrifty.

The handsome and symmetrical form of the trees, and their regularity

Fig. 371.—*A Portion of one of the Rows.*

in the rows may be imperfectly inferred from the annexed sketch of a portion of a row, fig. 371.

This orchard was long in coming into bearing, and in its earlier years was sometimes cited as an example of unprofitable orcharding, even with good care. We were unable to obtain an accurate statement of its product before the year 1873. That year it bore 3,000 barrels, and being the odd, or scarce year, the fruit brought good prices, 2,000 barrels being sent to Baltimore in autumn to be disposed of during winter. These sold at wholesale at $3.50 per barrel, and when freight, commission and storage were taken out, left a net price of $2.65 per barrel. Those sold at home brought a slightly higher net price. The whole sales amounted to $7,000. In the next two years the crop was small, which continuing thus two years in succession, threw the next abundant crop into the even year of 1876. This year there were about 3,000 barrels, which, by shipping largely to Baltimore, or keeping till spring, brought sufficiently high prices to make the aggregate receipts $6,000. Singularly enough, the two next years gave quite small crops—only 50 barrels being obtained in 1877, which brought $100, and only 350 in 1878, selling for a few hundred dollars. These two barren years changed again the productive season from the even to the odd year, and in 1879 the orchard bore 10,000 barrels, which sold for *seventeen thousand dollars.*

The crop is small this year, (1880) and the hope is entertained that the next—the scarce year—will afford another abundant crop. No cause has

been discovered for this change, first from an odd to an even year, and then back again to the odd year. It will be observed that the crop of 1879 brought at the rate of $135 per acre for the whole orchard.

No accurate estimate has been made of the comparative profits of the orchard so far, and the profits which would have been derived from the same land had it been kept in farm crops and no orchard planted; but Harry Chapin gave it as his opinion that the farm crops would have sold for the highest sum—the prospective value of the orchard being what they are looking for.

The grazing of the sheep under the trees has been of great value, not only by keeping the grass down and top-dressing the land with their droppings, but more especially by destroying the codling moth, the crop being fair and nearly free from this insect, and selling at a better price as a consequence. In an adjoining orchard belonging to a neighbor, the trees of which were set out at the same time and are now about as large, the crop is nearly spoiled by the codling moth, no sheep having the run of the orchard. The sheep have shown no disposition to gnaw the bark of the trees, except that the rams have sometimes attacked them. They have, therefore, applied lime-wash in which some bitter drugs had been mixed, but Mr. Woodward's wash is preferred, a statement of the ingredients of which is given on a subsequent page of this article.

Some years ago the canker worm obtained an entrance and made formidable inroads. It had infested about two thousand of the trees. The remedy of pine tar belts was employed with partial success, the tar being spread about 6 inches wide on the bark. Cold winters soon hardened the tar, and the canker worms went freely over it; warm winters kept it soft. It was necessary to renew it every few days. A neighbor applied two of these tar bands to his trees, but even these did not deter the insects, which crawled into and were held fast by the tar till they had successfully bridged the belt. Paris green was subsequently resorted to, and proved entirely successful, and the canker worm is now driven from all that neighborhood. The mode of application is to fill with water and Paris green one of the wagon tanks used by steam threshers, and to shower the trees with a forcing pump. A pound of Paris green will go over an acre, and fifteen acres may be treated in a day. The small quantity which has fallen on the grass has never injured the animals in the orchard, but caution is obviously required in such cases. Harry Chapin thinks it would be profitable to shower the orchard every year, to clear out insects generally. Being done early in the season, or as soon as the leaves appear, no harm can come to the fruit.

Mr. Chapin derives much advantage from the use of a large fruit cellar, which will hold 4,000 barrels of fruit, and enables him to obtain good prices in the spring when the market is poor in autumn. It is a two-story basement under a large barn, 40 by 60 feet. The lower

cellar is 10 feet high, the upper 8 feet. The walls of masonry are 3 feet thick below and 2½ feet above, and lined inside with boards and several inches of sawdust. The board floor above is covered with four feet of straw.

Mr. Chapin has a high appreciation of the value of clover as a fertilizer, and stated that on a piece of naturally good land, which had been so much exhausted by a previous occupant that it yielded only 12 bushels of wheat per acre, he raised a good crop of clover by plastering, turned it under, and the next crop of wheat was 25 bushels per acre. But the clover insect is destroying its value. After long experience in orchard management, he would recommend to cultivate the trees the first 8 or 10 years, and plant intermediate crops only in case he could secure plenty of manure; he would then seed to clover, turn in sheep, top-dress with manure, if to be had, and turn the clover under at intervals of a few years. He has found no advantage from the use of superphosphate. Mr. C. remarked to us that it had taken a long life-time of experience to acquire his personal knowledge on the subject. He has certainly given the public much valuable instruction by his successful example, and he merits the grateful appreciation of those who are to be benefited by his labors.

Ontario county, N. Y., and especially the neighborhood of East Bloomfield, is well adapted to the growth of apple orchards, and several large and fine ones were seen in the course of our rides. One of the best of these belongs to James T. Sheffield, covers 16 acres, and the trees were loaded with crops of fine fruit. Isaiah Norton has 40 acres, in excellent condition. Elisha Steele has an admirably managed 5-acre orchard, the trees about 20 years old, which bore 400 barrels in 1879, selling for $800. In 1878 he had 500 barrels, but that being an abundant year, they sold lower. He top-dresses with manure, seeds down and turns in sheep to destroy the codling worm. J. E. & H. Steele, brothers, have over 30 acres of orchard. J. W. Hopson owns the old original Heman Chapin orchard, in which the Northern Spy originated, and Norton's Melon was grown there after being brought from the East. The tree of Northern Spy died some years ago, but the Early Joe was loaded with fine fruit, and a portion of the Melon was growing and bearing. The trunks of each of these measured 15 inches in diameter, but some other larger growers measured 27 inches. More than half the old trees remain, some growing and bearing with vigor, the age of the trees from seed being 90 years. The annexed cut (fig. 372) represents one of these old trees, a few of which, however, have more vigor. Oliver Chapin, the

Fig. 372—*A Ninety-Year-Old Apple Tree.*

uncle of O. C. Chapin, came to this county in 1790, and immediately commenced the growth and dissemination of nursery trees, which he continued for nearly thirty years, and to him this region is indebted for many of its old and excellent orchards.

Genesee County Orchards.

The northern portion of Genesee county, N. Y., and especially the neighborhood of Batavia, is well known for its excellent and profitable apple and pear orchards. Through the kindness of Nelson Bogue of that place, we were enabled to examine some of the best of these orchards.

Fig. 373.—*Young Loaded Plum Tree.*

Mr. Bogue is himself a successful cultivator and an enterprising and careful nurseryman, having 50 acres under a fine growth of nursery trees. He has set out young orchards of various kinds, which were now coming into bearing. Among these was a young plantation exclusively of the Lombard plum, set in 1878, growing with great vigor, and heavily loaded with ripening fruit. Many of the trees were estimated to have about half a bushel on them, the central branches being literally covered with a dense mass of the brilliant violet red plums. Fig. 373 is an imperfect representation of one of these trees. These trees, as a matter of course, had received the best cultivation. Mr. Bogue finds rye, densely sown early in autumn, one of the best fertilizers for his land, when plowed under the following spring, after growing a foot high.

In the town of Oakfield we found several well managed and profitable orchards of dwarf pears. Lorin Rathbun had a 10-acre pear orchard, chiefly of the Duchesse, the trees being 16 years old. They are set 12 feet apart, and the outer branches nearly touch each other. A few years since this orchard bore 1,205 barrels of fine pears, or over a barrel on an average for each tree. They were sold at $5 per barrel, giving $6,000 for the crop, or $600 per acre for the entire orchard. This was his most profitable return, although in other years it has done well. The best paying crop on a small area was several years before, from an older orchard of a little less than one-fourth of an acre, which produced 19 barrels, and which sold for $18 per barrel, making the sum of $340, or at the rate of $1,360 per acre.

In the same neighborhood Julius Reed has a fine 400-acre farm, with some excellent orchards. From one-third of an acre of dwarf pear trees —all Duchesse, set in 1858—he has sold the fruit in the different years since bearing commenced for $2,340. Mr. Reed had a fine apple orchard, from 20 to 24 years old. The trees were planted 24 feet apart, with the

intention of thinning them when the tops began to touch each other. This thinning he had already begun, in the manner shown in the accompanying diagram, the first, or fig. 374, showing the position, by stars, of

Fig. 374.—*Close Planted Orchard.*

the trees before thinning, and fig. 375 showing by dots the trees that have been removed. This operation left the trees running diagonally across the orchard, 34 feet apart. Mr. Reed said that the improvement already effected indicated that in a few years after the thinning the fruit would be both more abundant and better in quality.

Fig. 375.—*Orchard Thinned Out.*

Eli Taylor of the town of Elba, occupies 420 acres of good farm land, and he has an admirable dwarf pear orchard of 2¾ acres. The net profits of the pear trees have, on an average of years, been equal to the net profits of all the farm besides, and in some years have exceeded those of the farm. There are over 1,000 trees, planted in 1865, 10 feet apart, and their average product had for several years averaged about $1,000 a year.

Mr. Taylor now plants his trees 12½ feet apart. He manures them moderately every year, and cultivates the ground. The trees were about

10 feet high, are all Duchesse, and were bending under their heavy crops (fig. 376.) He furnished us with the following statement of his receipts for the past nine years, which show the continuous profits. The trees were set in 1865, and in the year 1871 they bore

Fig. 376.—*Dwarf Duchesse in Fruit.*

21 barrels, sold at $10 per bbl., or for				$210
In 1872, 175 barrels sold at $5.50,				962
1873, 230	do.	do.	5.50,	1,265
1874, 210	do.	do.	6.00,	1,260
1275, 330	do.	do.	5.50,	1,815
1876, (no crop.)				
1877, 460 barrels,		do.	4.00.	1,840
1878, (no crop.)				
1879, 160 barrels,		do.	4.50,	720
				$8,072

Crop of 1880 estimated at 400 barrels.

Mr. Charles Cook, in the town of Byron, has an excellent 50-acre apple orchard, containing 2,400 trees of the leading standard winter varieties. They were 14 to 19 years old in 1880, and were set 20 by 40 feet apart, with the intention of removing every alternate tree when they become so large as to crowd each other, making the distance 40 feet each way. Hogs have the range of the older portion, which is one of the finest orchards we have examined. Although most of this orchard is comparatively young, about $2,000 worth of fruit has been sold from it in one year. Besides this large apple orchard—the most extensive in this part of the country—Mr. Cook has large plantations of peaches and blackberries.

The experience of orchardists through this region of country gives the strongest preference to the Baldwin among apples for profit, and to the Duchesse among pears. The large size of this pear makes it profitable in market, and its hardiness and resistance to the blight add greatly to its value. Where pear orchards were planted many years ago of different leading varieties, it is common to find that all have disappeared by disease or feebleness except the Duchesse; and fine orchards of this sort, covering several acres, with scarcely a vacancy, the trees from 10 to 20 years in bearing, show its general reliability. A single variety, however, ripening nearly at a fixed period, can never give a full supply for the market through an entire season, and experiments should not be relinquished to obtain a succession, at least through autumn and winter, of equally reliable sorts.

Orchards in Niagara County.

The county of Niagara, N. Y., has long been known for its successful orchards. Protected on the north by the open waters of Lake Ontario, and with the western winds of winter softened by their long sweep over Lake Erie, the climate is unusually favorable, while the soil is well fitted

for the growth of fruit trees. In 1875 the total apple crop amounted to about 400,000 barrels of selected winter apples, selling at from $2 to $3.50 per barrel. The entire fruit crop of the county was valued at $1,147,-000. The crop of 1877, two years later, was much smaller than in the preceding year, but amounted to over $390,000. In 1879 the apple crop amounted to more than 400,000 barrels of all sorts, and the entire fruit crop, exclusive of that used for home consumption, was estimated at $665,000. This success has not been owing wholly to natural advantages; the best orchards have been subjected to careful cultivation, and have not been neglected and grown up with grass, as generally occurs in some other counties.

Through the efficient assistance of J. S. Woodward of Lockport, we were enabled to visit a number of the best orchards in this county. The northern portion is conspicuous for its large peach and apple orchards. The peach crop was very heavy that year, and the trees were seen bending under their rich loads, largely of the brilliant and showy Crawford. At the time of our visit (1880) a throng of wagons, loaded with peaches in baskets, was continually pouring into Lockport for shipment by railway, and cars could not be found in sufficient numbers to convey them to Buffalo and other markets. The finest could be bought in Lockport for 25 cents per basket. Many orchardists were bewildered with the vastness of the task before them, in gathering and conveying their unprecedented crops to market. Most unfortunately a large share of the trees showed unmistakable signs of the yellows, and in some neighborhoods owners were looking for their entire destruction in a year or two. This disease made its first appearance five years before. It does not appear to have been introduced by contagion, but, as in other counties, to have made its appearance at long distances from other diseased trees. Orchardists who promptly removed infected trees did not succeed in checking it.

The apple orchards of this county continue to be eminently successful. A brief account of some that were visited will doubtless be read with interest.

J. S. Woodward, who resides in Lockport, has a 200-acre farm four miles out. His 30-acre apple orchard was set out in 1866. Two hundred sheep and 40 swine destroy all the codling worms that fall, and very few of these insects are found in the fruit. Sheep have proved more efficient than swine in the greater vigilance with which they seize every dropping apple. To prevent the sheep from eating the bark of the trees he washes the trunks with a mixture of lime-wash, common and whale oil soap and sheep dung. These animals are kept in the orchard till September. They eat the fruit and branches within their reach, and in some years have thus devoured 200 or 300 bushels, but the benefit resulting from keeping them so late overbalances any loss. In all cases the sheep must be well fed in troughs with grain, in addition to the grass and fallen fruit. He

thinks the hogs cleared out all the canker worms at the commencement of the entrance of these insects into the orchard. The trees are mostly Baldwins, with Rhode-Island Greening and Roxbury Russet. In 1879 the crop amounted to 2,600 barrels, which sold for over $5,000.

Fig. 377.—*Mr. Woodward's Orchard of Duchesse Pears.*

A young orchard of dwarf Duchesse pears (fig. 377) is one of the finest we have met with. It consists of 2,000 trees, 12 feet apart, and occupying four or five acres. The ground is kept perfectly clean by cultivation. The trees were set out in 1876. In 1879 it bore 75 barrels of fruit, which, at $4.50 per barrel, sold for $337. In 1880 the crop on the trees was estimated at 200 barrels.

Mr. Woodward's magnificent peach orchard of 20 acres was estimated in 1880 as good for 10,000 baskets of fruit. It is mostly Early Crawford, and the trees were loaded with showy peaches, but most of them were ruined with the yellows. On its first approach the diseased trees were removed, but since then it appears to have come down alike on the whole orchard. Mr. W. remarked that "the glory of the peach orchards of the county has become a thing of the past." Young trees which have never borne have been alike affected.

Special attention is given by Mr. Woodward to the manufacture of manure, and about 1,600 loads are annually made on the farm. One-third, or 500 to 600 loads, is applied to the fruit trees. He buys animals, purchasing oil-meal and other feed, as he finds necessary, and sells them in market. Every load of manure he makes, instead of costing him anything, actually nets him a dollar each. We saw nine acres of luxuriant mangel wurtzels for feeding his animals, which he estimated at 1,600 bushels per acre. His barns consist of a combined building 76 by 108 feet, a horse barn 30 by 40 feet, and a cow barn 26 by 36 feet. These contain ample space in their basements for the storage of winter apples till spring sales, when prices are unsatisfactory in autumn.

One of the most productive orchards in the county for its size, is that of Peter D. Miller. It occupies 11 acres, and contains 500 trees set in 1858. The soil is light, deep and rich, and being well cultivated, the trees have made a vigorous growth. Although placed 31 feet apart, many of the branches have met from opposite rows, and in some instances

have extended some feet past each other. The soil has been moderately manured alternate years. We measured some of the trunks 13 and 15 inches in diameter, and all appeared to be at least a foot. Seven acres of the orchard are Baldwins, and these have furnished most of the profits. In some years the crop has sold for more than $5,000, and for the last 12 years, bearing alternate seasons, the crops. taken together with the barrels, have brought $32,000, or more than $20,000 net above all expenses. Mr. Miller continued in debt for his farm till this orchard lifted him out, and gave him many thousands at interest. He informed us that a portion of his orchard, containing 140 trees of the Baldwin, when 16 years old, bore in the year 1875, 1,230 barrels, which sold at $3.25 per barrel, or for $4,582.

Mr. M. proposes now to discontinue the annual cultivation of his orchard, and seed it to grass, continuing the manuring and turning in sheep. He will never in future set the trees nearer than 40 feet, and on his deep, rich soil would prefer to place them 44 feet apart. On heavy or clay land they might be nearer.

Wm. B. Corwin, whose farm adjoins that of Mr. Miller, had an orchard of the same age, occupying 12 or 14 acres, which he grazes with sheep. He has sold in one year 2,000 barrels of fruit, at $1.75, $2 and $2.50 per barrel. He had a young orchard, 4 or 5 years old, occupying 25 acres, the trees of nearly perfect symmetry of form.

Fig. 378.—*Specimen of Mr. McClue's Peach Orchard.*

One of the finest peach orchards which we saw, was on the farm of Charles McClue, who owns several hundred acres of land. The trees are 20 feet apart, and the ground is clean with cultivation. On 20 acres of the orchard they were set in 1875, and some were estimated to

bear three bushels. Being extra fine, Mr. McClue thought they would sell at $1 per bushel, making a handsome return for the 1,200 trees of this portion of his orchard. He has found peaches the most profitable fruit, but he feared the yellows, which as yet had made little or no inroad in his orchard.

A Cayuga County Orchard—Standard Pears.

For many years a profitable orchard of standard pears has been in the possession of John Morse of Cayuga County, N. Y., and in some years has yielded large returns. A portion of it was set before 1850, and when we visited it in 1870, no fire blight had ever been seen on any of the trees. It was then thought that the natural drainage of the soil had caused this freedom from disease ; but within a few years afterwards hundreds of trees perished. In some years, before the disease had made serious inroads, Mr. Morse obtained from his seven acres of Bartletts not less than 600 barrels of pears of fine growth, which he had shipped to an eastern city and stored in a cold house. The ripening was thus delayed, and they were sold after the supply in market was mostly gone—some of them, at that time of high prices, at $26 per barrel, the average being a little over $15. A single crop amounting in the aggregate to $9,000, was a handsome return. At our last visit, this Bartlett orchard had a somewhat irregular appearance, younger trees having been transplanted where the blight had left vacancies. In 1880, being the scarce year, it had furnished only 176 barrels for shipment, which were expected to bring over $6 per barrel, or about $5 after deducting expenses—in which case the product reached about $900 for the seven acres.

In the early years of the history of this orchard, Mr. Morse allowed the ground to grow in grass ; but finding the fruit of poor quality, he had now cultivated the soil for many years, with the addition of manuring This practice succeeded well, as the large crop just mentioned furnished the proof. He thought that, since the prevalence of blight, he may have carried it too far, and he proposed to seed down for a time. There is no question, however, that the high prices he has received have been partly owing to this cultivation. We measured some of the specimens of the Bartlett five inches long.

Mr. M. had found the Bartlett the most profitable of all the varieties. Next to this is the Duchesse (as a dwarf) ; then the Beurre Bosc. The Anjou does not succeed well with him. Skill in marketing constitutes an essential portion of his success ; and this skill is only to be acquired by experience.

The entire pear orchard comprised about 30 acres, and there was an equal extent of apple orchard. Two acres of the latter presented a strong and favorable contrast with the rest, although all was a good orchard. The two acres, some 30 years old, have been subjected to cultivation and manuring ; and swine having the run of the ground, pick up all infested

and dropping fruit, and root in the ground and destroy the insects of the soil. It was estimated that in 1880 the two acres would afford 600 barrels of apples. But the pears, although attended with more difficulty in management, afford a much heavier and more profitable return.

A Columbia County Orchard.

The fruit farm of Robert McKinstry, near Hudson, N. Y., contains 33,000 trees—the largest number of apple, pear and cherry trees, taken as a whole, in this country, and probably in the world. The trees would form a continuous line, 20 feet apart, from Albany to New-York City, His farm of about 300 acres is wholly planted with fruit trees. The soil is a light, gravelly loam, with a natural drainage, and is well adapted to the growth of fruit. The orchard extends for nearly one mile along the public highway, and to over half a mile in the rear. From some points, where a large portion is seen, they appear like a sea of trees. Six miles of orchard roads extend through the grounds, for access and conveying away the gathered fruit. From 40 to 70 men are employed in gathering, assorting, packing and drawing to the railway during the busy season, which extends from early in June to approaching winter.

The apple trees, which are 26,000 in number, are planted 20 feet apart, with the intention of removing alternate and diagonal ones when they interfere in growth. The first were planted in 1857, and the average age in 1880 was about 14 years. At present they have full space. For a few years they have borne good crops—in 1878 over 20,000 barrels. These are all, or nearly all, sent to Europe, the shipping being commenced in August. Complete arrangements are previonsly made for this purpose, and in one case Mr. McKinstry received a cable despatch of the arrival and sale of a consignment ten days after it was sent to Catskill station. Two or three cars are frequently loaded in a day. The apples succeed best by being gathered rather early.

The following is a list, with number of trees, of most of the apples planted in this orchard:

7,000 Rhode Island Greening,
7,000 Baldwin,
4,000 Tompkins King,
1,000 Red Astrachan,
1,000 Northern Spy,
200 Hubbardston Nonsuch,
200 Wagener,
200 Jonathan,
200 Esopus Spitzenburgh,
200 Ben Davis,
200 Oldenburgh,
200 W. Seeknofurther.
200 each of Roxbury and Golden Russet, &c.

The orchard is kept well cultivated, horses plowing the spaces between the rows, and oxen the ground nearest the trees, to avoid injury with whiffletrees. Two yokes of oxen are constantly employed for this purpose, and sometimes four, and four or five teams of horses. Care is specially taken to drive the oxen gently, that they may move quietly, and they soon learn to make voluntarily the required deviations to plow near or between the trees. On the approach of winter, a bank of mellow

earth is thrown up with the plow against the trunks to exclude the mice. This constant cultivation has given fine fruit, specimens of the Baldwin having been obtained which weighed a pound, and of the Tompkins King weighing 21 ounces.

The cherry has been found quite profitable for market. The orchards contain 4,500 trees, largely of the following sorts:

500 Governor Wood,	200 Rockport Bigarreau,
500 Napoleon Bigarreau,	200 or 300 Morello,
800 Black Tartarian,	200 or 300 Early Richmond.

And other varieties, extending to over twenty sorts. The trees were set about 1869. The season of 1880, which was so dry as to be injurious to the apple trees, favored the securing of the cherry crop, over 25 tons having been sold, with scarcely the loss of a bushel by rotting. The different sorts ripening at different periods, prevented the pickers from being over-crowded with work at any time, and not more than 35 were required at once, who would gather about two tons in a day. The fruit was sold chiefly in New-York market, at from 7 to 18 cents per pound. At 12 cents the 25 tons would bring $6,000—a good return for 40 acres. The soil appears to be peculiarly adapted to the growth of this tree, and it is occasionally necessary to sow oats in the orchard to reduce the vigor of the trees and prevent bursting of the bark. Mr. McKinstry has had, in one instance, nine bushels of cherries from a tree of the Napoleon Bigarreau.

Among the 2,000 standard pear trees, are 700 Bartletts of handsome growth, beside which there are 200 each of Seckel, Sheldon and Anjou. Beurre Bosc proves one of the best market sorts. We saw very little indication of blight among the pear trees.

The borer proves to be the worst enemy of the apple tree, and the many trees which have been destroyed have been promptly replaced by replanting. The only remedy is opening the holes of this insect with a knife and destroying with a flexible wire. Sometimes a dozen have been found in a single tree. The codling moth has given little trouble. Mice were formerly quite destructive, but they are excluded now by the remedy already mentioned—namely, by plowing up mellow earth against the trees.

Beside the preceding named kinds of fruit, Mr. McKinstry has a vineyard of 1,700 Concord grapes, an orchard of 1,000 peach trees, another of 200 crabs of different varieties, and the highway is lined with 450 maples. He gives constant personal attention to the management of his orchards, which show the superintendence of a skillful hand, although the trees had suffered in 1880 by a long-continued and extraordinary drouth.

ORNAMENTAL AND VEGETABLE GARDENING.

Planting a Wild Garden.

WITH THE IMPROVEMENT of a cultivated taste, the appreciation increases for a wild or natural garden. It was the custom formerly to make gardens appear as artificial and stiff as possible. Straight lines and formal curves exclusively prevailed. One side of the grounds was an exact reflection of the other. Now this stiffness is becoming discarded, and the grace of free and irregular beauty is taking its place; and the immeasurable superiority of undistorted forms is shown in all the wildness and intricacy of natural scenery.

We have seen a beautiful unplanted grove growing among the rocks of a wild gorge, rendered exceedingly attractive by interspersing the native shrubbery with planted rhododendrons, which were in full bloom when we

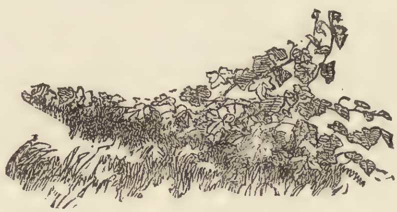

Fig. 379.

saw them. Additional charms might be added by investing the rocks and bushes with the trailing forms of the hardy clematis, of the periploca, climbing honeysuckles, &c., (fig. 379); while the wood lilies, gentians, and other plants which bloom freely in the shade, would give additional attractions. Early in the season masses of the hepatica, sanguinaria, erythronium, and

Fig. 380.

other spring-blooming wild plants, would make such a wild garden exceedingly attractive (fig. 380). Cultivated exotics, such as our common bulbs, snowdrops, squills, hyacinths, &c., might be introduced in open spaces

along the borders of the more dense portions of the wild shrubbery. If these were properly introduced, they would lose all the artificial appearance too often given them, and become an essential component part of the wild scenery, and their ornamental effect be thus greatly increased.

For such a garden to give the best effect, it is almost essential that the surface be more or less uneven, and a small ravine, with some rocks, would be a valuable addition. A stream of water lined with ferns and water plants, would add still farther to its charms. A narrow, curved gravel-walk, kept smooth and in perfect finish, would not be discordant with the general effect; it would be the only artificial part of the grounds that could be admitted.

Those who may have small "waste" portions of land on their farms or suburban grounds, where wild bushes and trees have grown up, may at a moderate expense, some taste, and a good deal of industry, make a beautiful garden, at much less cost than the formal plantations which they do not hesitate to undertake. Summer is the time to take it in hand; to set out the bulbs, and to secure the wild flowers from the woods. This should not be sparsely done—they should be planted in irregular and profuse masses, and the appropriate positions of each be assigned them.

MAKING LAWNS.—The quickest way for a limited area is to procure turf from an old, even, closely-grown pasture, cut accurately square, and scraped to even thickness, according to the illustrated directions given on page 103, vol. VIII, of RURAL AFFAIRS. Seeding down is cheaper, and is adapted to larger grounds. If the soil is weedy, summer-fallow it one season, by repeated and continued plowing and harrowing, turning up, starting and killing all foul weeds. Make the surface rich with old manure or compost before a few of the last harrowings; sow, early in spring, at least a bushel or two of any fine grass per acre, brush or roll in, and a dense mat of new grass will soon make its appearance, the manure preventing the bad effects of drouth. Without the summer fallow, weeds may give future trouble. Use the lawn mower every five days till mid-summer, and gradually less often afterwards.

DURABLE SUMMER HOUSES.—These, when made of rustic work, or of small strips of wood for the lattice work, are liable to decay in a few years. A writer says that he prevents decay by allowing only annual climbers to cover them, which are stripped off on the approach of cold weather, and they remain bare through winter and spring. A much easier, better, and more perfect way, is to soak all the wood-work as soon as the structure is made, with crude petroleum applied with a coarse brush. In an experiment now before us, light wood-work so treated, remains perfectly sound after 15 years, when other work not oiled was decayed in four years.

ORNAMENTAL SHRUBS.—There are a few ornamental shrubs and small trees which are so widely known, because so desirable in every respect

for small grounds, that it is hardly necessary even to name them, such as the common Siberian and Persian lilac, Tartarian honeysuckle, philadelphus, Japan quince, purple fringe, snowball, &c. The silver bell (*Halesia*), although not new, is a fine ornamental shrub; and the same may be said of the purple-leaved Barberry and dwarf horsechestnut. The small double-white spirea and the two species of weigela, although rather new, are widely disseminated. Still more recently introduced are *Deutzia crenata*, one of the most beautiful of summer bloomers, and the new hydrangea (*H. paniculata grandiflora*), magnificent in early autumn with its large panicles of white and rose flowers. Both are perfectly hardy.

Preventing Suckers.—There are some good shade trees which have the fault of sending up many suckers. The entire removal of such trees is often followed by a profuse growth over the whole surface. It is therefore well to remember that suckering trees should always be cut away in summer, and not while dormant. If cut in summer, such a check will be given to the roots that few suckers will come up; cutting in winter or spring will cause an abundant growth. Placing common salt on the stump as soon as the tree is cut, will prevent their growth at this season. If the salt is applied afterward it will do little good.

Plants for Shade.—Vick's Monthly recommends the following flowers for the shade, where it is necessary to plant in such places: All the lilies which grow in partial shade, violets, pæonies, lily of the valley, aquilegia and ferns. To which we may add several native plants which bloom freely in the woods, as *Trillium grandiflorum*, *Hepatica*, *Phlox divaricata*, *Pulmonaria*, and especially *Lilium philadelphicum*.

Popular Roses.—A French journal gives the following number of votes received by certain varieties of roses, out of 85 lists sent in by amateurs: La France had 79 votes; Baronne Adolphe de Rothschild, 76; Paul Neyron, 76; Gloire de Dijon, 72; Souvenir de la Malmaison, 72; Jules Margottin, 70; Marechal Niel, 70; Baronne Prevost, 57; Gen. Jacqueminot, 52; Captain Christy, 50; Belle Lyonnaise, 47; Eugene Appert, 47; Louis Van Houtte, 47; Anne de Diesbach, 47; Aime Vibert, 44, and a long list ranging down to 22 votes. The list could be varied in this country, and La France, for example, placed a little lower down, on account of a want of hardiness and vigor of growth.

Mildew on the Rose.—A writer in the California Horticulturist speaks of the success of the application of sulphate of copper for mildew on rose bushes, using half an ounce or so to a pail of water.

The Chinese Primrose.—In an extended article on its culture, the Gardener's Monthly gives the following essential requisites for success: Gather the seeds when fully ripe, as they are worthless when immature; keep the young plants moderately moist, not wet, and not too warm. Give plenty of light. The soil must be of the richest quality, or of one-third muck or decayed sods, one-third rotted stable manure, and one-

third sand, intimately mixed and sifted. Cover the seed a tenth of an inch and press the surface, and water with a fine rose sprinkler. Avoid soaking the young plants. The best time to sow is early in July. They may be removed to small pots in a month, and will begin to bloom in December, after transferring to larger pots as the roots require.

Saving Flower Seeds.—A writer in the Practical Farmer gives the results of experience in saving flower seeds. No general rule can be laid down, each sort requiring special treatment. Pansy seeds must be saved while they are quite green, as the pods burst as soon as they turn yellow, throwing the seed several feet. Plants of phlox are pulled up when a fair amount of the seed is ripe, and spread on large sheets in a warm garret. On a small scale hand-picking may do. Petunia and portulaca are treated in the same way, except that the portulaca plants are cut off, and they grow up again for another crop. Verbenas must be hand-picked twice a week for several weeks.

Summer Cultivation.—The thorough cultivation of hoed crops, fruit trees and small fruits, which is continued through spring and early summer by good managers, is frequently relaxed later in the season, and weeds often get a start and some headway. Continue the work of their destruction, and by keeping the surface of the soil clean and mellow, kill them before they come up. Use only the best and sharpest tools, grind hoes often, do by horse-power all that you can, and finish by hand. Stir the ground after a shower, and before a hard crust can form.

The Plow in Gardens.—A common reason why farmers of moderate means have not had better kitchen gardens is that they have not learned how to cultivate them at little expense. Going through once a week, to keep the crops clean, and in the best growing condition, could not be performed by hand. Many are imitating the practice of the large market gardeners, and do the work by horse labor, and with the drill, plow and cultivator. There are a few crops that need planting in beds, and a small portion of the garden may be devoted to these. All the rest may be arranged for horse work. The great advantage here is that no care or skill is required in laying out All that is needed is a turning ground at each end, 12 feet wide, for the horse. This may be a smooth grass walk. Rows of currant, gooseberry and raspberry bushes and dwarf fruit trees may occasionally extend across the garden parallel with the rows of vegetables. After the plants have a fair stand the horse will do nearly all, and the garden may be kept cleaner than ever before at a tenth of the cost. By passing once a week, and keeping the ground constantly mellow, the crops will make a fine growth.

Hoeing Cabbages.—An old farmer informed us that he once tried an experiment to prove the advantage of keeping the soil well stirred among his cabbages. He and his hired man were engaged in a contest which should have the best crop. He hoed his once a week all summer, and yet the hired man's cabbages grew best, for which he could not account, as

he never saw him at work among them. But accidentally he found out the secret. The man rose every morning at four o'clock, and did the hoeing before sunrise, when no one saw him. He hoed them, not once a week, but six times in the week. This experiment shows the importance of planting the crop where a narrow cultivator drawn by a horse can readily be run, and the work done rapidly, often, and at little cost of labor.

WINTER CABBAGES.—A writer in Vick's Monthly says that plants set out late, from June or July sowing, keep best, and are found almost as tender in winter as cauliflowers. Those which are sown early and grow to large size do not compare with the excellent and tender heads of young cabbages.

FROST EXCLUDED BY KEROSENE.—J. J. H. Gregory of Marblehead, Mass., states that the temperature in his vegetable cellar sometimes went a few degrees below freezing, making the air just cold enough to spoil the contents. He procured a kerosene stove, which had six large burners, and holding two gallons of oil. Whenever his two thermometers in the cellar indicated danger, he lighted the kerosene, by which he raised the temperature ten degrees when necessary, and he said that this proves a convenient, simple and cheap way to prevent any loss.

PRODUCTIVENESS OF TOMATOES.—A writer in the Prairie Farmer says that tomatoes yield on an average 125 bushels per acre, although 400 bushels have been produced in rare instances.

INSECTS ON ROSES.—A writer in Vick's Monthly mixes a teaspoonful of white hellebore in a pailful of water, and applies it with a sprinkler. This destroys the insects, and the roses are clean. A correspondent of the Gardener's Monthly finds whale-oil soap the most effectual remedy, one pound of soap being added to eight gallons of water. It is applied at night, the plants being thoroughly drenched, every two or three days.

THE ROSE BUG.—The following remedy has been published in some of the papers: With a pine stick in a vial of turpentine, touch a cluster of the bugs, or each one separately. It kills where it strikes. A more rapid way would be to cover thinly the bottom of a tin pan with turpentine or kerosene, and then knock the rose bugs from the bush into the pan. Or immerse a cloth in kerosene and spread it on the bottom of a flat basket, pan or box, and jar the rose bugs on it.

KEROSENE FOR PLANT LICE.—A correspondent of the California Horticulturist, after using carbolic acid for the scale bug on orange trees, camellias, &c., which proved too strong in solution, destroying both plants and insects, employed pure kerosene, through an atomizer, spraying it over camellias. The leaves were covered with the scale and black fungus. A very small quantity was enough to cover the whole plant. After the fluid had evaporated, the scales were found dead, shrivelled and detached; the black fungus was dried to a loose powder. The same remedy was tried on pelargoniums and the flower buds of greenhouse roses, but these

were too delicate, and the new and tender growth, as well as the insects, was destroyed.

SCABBY POTATOES.—Dr. Hexamer states, in the Tribune, that the scab on potatoes is produced by "mites," or minute animals, which first cause blisters on the young tubers, leaving subsequently holes or pits. The use or absence of ashes, and manures from various animals, seems to have no influence on them one way or the other, nor scabby or free seed, nor land on which potatoes have not been raised for many years; but since the exclusive use of commercial fertilizers, they have become entirely free from the scab.

CABBAGE WORM.—We have seen a statement in some of the papers that cabbages had been kept entirely clear of this insect by the aid of chickens, in a plantation of some thousands of plants. Screenings were first scattered to attract the fowls among the cabbages, and then discovering the worms they kept the whole patch clear. We have found this method to answer well, provided the chickens are not full grown; when older, they eat the cabbages. Young turkeys are still better, their keen eyes and quick motions allowing nothing to escape.

The members of the Elmira Farmers' Club, as reported in the Husbandman, severally recommended cayenne pepper, whale-oil soap and tar-water, for the cabbage worm. Objection was made to the whale-oil soap, as imparting an objectionable taste to the cabbages. The cayenne pepper might do best in a strong decoction. Paris green was mentioned as very effective, and it would doubtless prove so both to the worms and to eaters of the cabbage.

NOTES AND ITEMS IN FRUIT CULTURE.

RENEWING FRUIT GARDENS.

THE OWNERS OF GARDENS and family orchards find that as the trees become old, some of them lose their vigor and productiveness, and require special attention, and to some extent the plantings must be renewed. It is not often that the old standard sorts can be replaced, but there are some new varieties that may be added to old collections with advantage.

Fruit trees too frequently lose their productiveness and value by neglect. Peach trees are more sensitive to grass and hard ground than cherry trees or standard pears. It often happens that after a few fine crops of peaches on thrifty, young and cultivated trees, the owner ceases further care, and the trees linger and die. Constant tillage of the ground, and the necessary cutting back to keep up a thrifty growth, would preserve them many times longer. It is not often that old and stunted peach trees can be restored to vigor and a good form; but sometimes cutting them

down to the ground at the right season of the year (or when dormant) has sent up young shoots that have given a second edition to their lives, in connection with good tillage. If young shoots start out near the centre of the head, all the rest may be cut off, and a new head is formed. This treatment, however successful it has occasionally been found, must not be mainly depended on, but young trees set out are to be the main reliance.

There are very few owners of family orchards and fruit gardens who would not find an advantage in making additional plantings. The new varieties, as Amsden, Beatrice and Rivers, will give them a succession of peaches at least two weeks earlier than the earliest of Hale's and other old sorts. By a careful selection they may fill in gaps elsewhere. Land owners as far north as Albany and Rochester, where the trees will endure the winters, may as well as not have peaches in full supply from the last of July till autumn frosts. Their enjoyment, however, will be of few years' duration unless they plant the trees where they will be subjected to cultivation.

Apple trees require less frequent renewal than peaches, but even with these, important additions may be made by selection in order to obtain a good supply at all times. The earliest apples ripen in Western New-York early in August; there should be a constant supply for the table and for culinary purposes until the following spring. The barren or "off" years are now a serious drawback to a yearly as well as a continuous supply in season. This deficiency may be at least partly remedied by top-dressing the trees annually with manure, and by stripping off all the blossoms as soon as they are expanded in the productive year, on a part of these trees. Top-dressing with manure is to be especially recommended for this purpose. If the orchard is so fully grown as to cover the whole ground with its shade, it may be seeded to grass, and grazed with sheep from spring to near picking time. The close grazing will be good for the orchard; the droppings of the sheep will add to the effect of the regular top-dressings; and the devouring of the fallen and immature fruit by the sheep will destroy many of the codling worms. There should be a sufficient number of sheep to pick up all the droppings from the trees, and to keep the grass short; and to prevent these animals from suffering for food, place a sufficient number of feeding troughs in the orchard, and see that they are regularly supplied with oats or corn.

Pears give ripe fruit from the middle of July till after midwinter. The regular succession is easily made out.

Plums may be had by any one who is willing to protect them from the curculio for about two months, and they afford not only an agreeable variety in connection with other fruit, but are excellent in themselves.

Of the small fruits, currants are too much overlooked. There is scarcely a reader of these remarks who would not do a good thing for himself and family, by setting out fifty bushes. They never come amiss, and they

hang on the bushes two months, giving a valuable daily supply to the table, and rather improving in quality with age. The only trouble with them is the currant worm, and this is destroyed, if taken in time, by a few minutes' work with hellebore. By cultivating and enriching the ground, and thinning out the old wood, the fruit becomes larger and better, and makes a finer display on the table.

For the benefit of those who would like a selection made of a few leading sorts of these different fruits, we give the following, which every man will vary more or less, by adding to or reducing, according to locality or latitude, or personal preference. If securely heeled-in till spring, by filling closely all interstices among roots and stems, in smooth, clean ground where mice will not reach them, they may be safely set out early, and a better selection obtained than after the sales of autumn. Purchasers will remember that trees of most kinds are cheap and abundant at nurseries in August, and that no better time could be chosen to replenish their plantations.

Peaches.—The following will give a good succession for two months at the North, and may be considerably varied according to circumstances and still accomplish the same end: Amsden, Early Beatrice, Early Rivers, Hale, Serrate Early York, Early Newington, Cooledge, Large Early York, Crawford's Early, Morris White, Crawford's Late, Stump, Smock, Ward's Late. Heath Cling will ripen in warm autumns, and may be kept two or three weeks in a cold place.

Plums.—Primordian, Rivers' Early Favorite, Early Royal, Prince's Yellow Gage, Lawrence, Lombard, Purple Gage, Smith's Orleans, Jefferson, McLaughlin, Reine Claude de Bavay, Coe's Golden Drop, Coe's Late Red.

Cherries.—In giving a list of these, we must remark that nearly always they are eaten before ripe. Take the old Mayduke for example—very few persons who raise it have ever seen it fully ripe, when it is quite black, instead of dark red, and nearly double the size when commonly picked. An extensive marketer of fruit told us he sold the Black Tartarian quite early as "red cherries," and the same variety three weeks later, and when much larger, as "black cherries." The Early Richmond, from its name, would be regarded as one of the first sorts, and it is usually picked early, but it is never fully ripe till the middle of July, when nearly all other sorts are gone. When fully mature it is very dark red, almost black, and much larger in size than when commonly used. Here comes in a difficulty; the birds sweep off all that are left long on the tree, and they are the only fruit devourer against which we know of no protection.

The following are among the best cherries, in the order of ripening: Early Purple Guigne, Belle d'Orleans, Doctor, Coe's Transparent, Black Tartarian, Mayduke, Rockport, Early Richmond, Yellow Spanish, Downer's Late, Morello.

Apples.—Nearly every fruit raiser prefers to make his own list, and will include, among other sorts, Early Harvest, Summer Rose, Sweet Bough, Primate, Autumn Strawberry, Porter, Gravenstein, Twenty Ounce, Fall Pippin, Hubbardston Nonesuch, Rhode-Island Greening, Baldwin, Northern Spy, Roxbury Russet.

Pears.—All will say Bartlett—and before this we might begin with Summer Doyenne, then Giffard, Rostiezer, Washington and Tyson. After Bartlett take Seckel, Boussock, Howell, Sheldon, Bosc, Urbaniste, Duchesse d'Angouleme, Anjou, Lawrence, Winter Nelis and Josephine de Malines. If you have a special desire not to be troubled with blight in future years, your best chance for escape will be to plant largely of Winter Nelis, Seckel, Anjou and Duchesse.

Grapes.—Every owner of a place should have a good supply for his table from the first of autumn till midwinter. He may plant the eighth of an acre or more with Hartford, Delaware, Diana, Concord, Isabella, Salem, &c. Try the new sorts of high promise sparingly till well proved.

Blackberries of the Kittatinny and other sorts; and Philadelphia, Clarke, Franconia, Herstine and black-cap raspberries; almost any sort of currant, and the well-known strawberries, will give an excellent, valuable and grateful supply of fresh fruit for the table through summer. Secure all your trees and plants, and no high-priced ones, and be ready to do a good deed for yourself and your family, by providing plenty of delicious, fresh fruit.

Miscellaneous Suggestions.

Peaches in Cold Climates.—The severe winters in portions of the Western and Northwestern States, have proved a formidable barrier to the successful cultivation of peaches, the fruit buds being killed by the intense cold when the trees escape. Different modes for protecting the fruit buds have been resorted to, but none appear to have been so successful as that adopted by Stephen Jackson of Marshall county, Iowa.

Fig. 381.

Although the latitude is only 42 degrees, the thermometer usually sinks to 18 or 20 degrees below zero, and sometimes much lower, leaving little chance for the peach crop. Mr. Jackson sets his young peach trees in an inclined and nearly prostrate position, as shown in fig. 381. On the approach of severe weather, he throws on them six or eight inches of compact hay, which affords sufficient protection. The fruit buds escape, and

early the following spring, or sooner, the hay is removed, and is not injured for feeding animals. His trees are loaded with fruit every year, and to keep the crop off the ground, to which the weight of leaves and fruit would bend it, short props are inserted, as in fig. 382. He had in 1879 a bushel of fruit from each tree, while other trees in the neighbor-

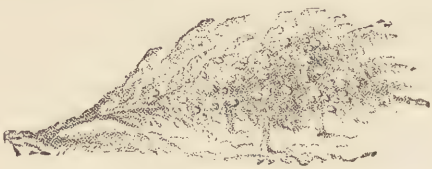

Fig. 382.

hood bore nothing. The fruit is excellent in quality—better than he can buy in market; perhaps near proximity to the ground may cause it to ripen better. It will be seen that this mode of growing may be employed in the extreme North without any difficulty, where trees will grow at all and early sorts ripen, by adapting the thickness of the covering to the severity of the climate.

Elevated Peach Orchards.—A correspondent of the Michigan Farmer mentions a strong case showing the advantage of placing peach orchards on elevated ground, and away from frosty valleys. At Paw Paw, twenty-five miles east of Lake Michigan, and beyond what is termed the "fruit belt," no peach buds escaped the frost of the winter of 1879-80 on level ground. On all elevations of fifty feet or more all escaped injury. Lower down the tops of tall trees had only a few buds which escaped. On the range of hills in that region, all the trees were loaded with blossoms from top to bottom.

Peaches for Missouri.—George Husmann, who has fruited over fifty sorts by way of trial, recommends the following list of peaches for a regular succession in that State from the first of July till the middle of October: Amsden, Hale, Tillotson, Morris' Red Rareripe, Oldmixon Cling, Oldmixon Free, Royal George, President, Ward's Late, Heath Cling, Steadley, October Beauty. The last named is a new and local sort; it ripens half a month later than Heath Cling. Mr. H. would perhaps add Beatrice between Amsden and Hale, and Early Rivers between Hale and Tillotson.

The Peach Grub.—Where not abundant, these insects are easily removed with the point of a knife. A correspondent of a western paper uses stiff paper coated with grafting wax, first removing all the grubs, drawing away the earth, and placing the paper around the stem so as to reach a foot high. The wax causes it to adhere to the stem without tying. It is intended only for young trees, and it may be applied to newly transplanted ones before they are set. It needs renewing every spring.

The following composition of a wash to repel this grub is given by M. B. Bateham: For an orchard of say 500 bearing peach trees, we buy a pint of crude carbolic acid, costing not over 25 cents (or half as much of the refined), then take a gallon of good soft soap, and thin it with a gal lon of hot water, stirring in the acid and letting it stand over night or longer; then add eight gallons of cold soft water, and stir. We then have ten gallons of the liquid ready for use. Some peach growers use a little more and others less of the acid. The proportion stated is strong enough, and if much stronger, would be likely to injure the trees. The wash should be thoroughly applied with a swab or brush around the base of each tree, taking pains to have it enter all crevices.

Distances for Grapes.—The strong-growing American grapevines must have ample space to grow. They may be restricted for a few years and bear moderate crops, but when they are older they should have a full chance to throw out their long arms. The late Wm. A. Underhill of Croton Point, N. Y., showed us a part of his twenty-year Isabella vineyard where he had allowed the vines to extend over a roadway, giving them some 16 feet more room. The improvement in the crop was striking. Mr. A. Hood of Ontario planted Concords 6 feet apart each way. They bore little fruit. The spring of the seventh year he took out every alternate vine, and then had a fine crop. He tried a similar experiment on a large Catawba vineyard planted 8 feet apart; the result was a greatly increased quantity of grapes. He also stated that Concord vines covering 24 to 48 feet of trellis, carried by actual measurement more grapes than any adjoining vines 12 feet apart and occupying the same extent of trellis.

An experienced grape-grower stated to us that he had planted his vines 12 feet apart, and had grafted every alternate vine with another sort. The grafts failed to grow, and the old vines, being thus thinned to one-half in number, gave a much better crop than the whole did before. We might cite many other cases—all showing the importance of giving ample space to strong growers. And one other precaution should always be observed—never to allow the vines to overbear; thin out the numerous bunches. We do not now hear vineyardists, as formerly, boast of the many tons of grapes they have raised to an acre, as they have learned that the fruit is better, and the vines less exhausted, when the thinning has been properly done.

Planting a Vineyard.—M. B. Bateham writes to the Practical Farmer that in planting a vineyard with a view to profit, he would first select a high ridge of clay land near the lake, and in a neighborhood noted for escaping the rot, and not near old vineyards. He would select and plant such newer sorts as he could procure, known to be of good quality and fine appearance, and not likely to be soon plenty in the markets. If the prices of the plants were too high, he would wait a year; if mildew attacked the vines, he would apply sulphur. Among the new sorts, he

named Worden and Brighton, and of those still newer, the Prentiss, Duchess and Niagara.

Keeping Grapes.—The Southern California Horticulturist recommends the following mode: Spread the carefully cut fruit thinly on shelves or tables for a few days, to dry up the stems a little. Then cut clean, dry rye straw in a straw-cutter, about an inch long, and cover liberally the bottom of a suitable tightly-jointed box, on which place a moderate layer of fruit; then cover with the cut straw liberally, and lay on fruit again, and thus proceed. Put them in a cool, dry place, and the grapes will keep sound for several months.

Top-Grafting Apple Trees.—An inquirer asks what sorts he shall insert in the tops of a number of apple trees in his orchard, which are 10 to 12 years old, and which, having borne, have proved worthless, and whether the change could be made by budding in summer. Answer: The same sorts may be inserted which prove most valuable among his bearing trees; but it is sometimes advantageous to graft slow growing sorts of value, as they will grow with more vigor, and have a good base to stand on—such, for instance, as the Jonathan and Red Canada, apples of excellent quality, and which in some markets bring advanced prices. A large number of grafts, say ten or twenty, judiciously inserted, will make a bearing head sooner than a few, but you must vary the number with the condition of the branches. It is better to give more than one year to the operation, beginning in the middle and upper part first, so as not to check the tree too much by lopping off all the growing part. Budding can only be done in mid-summer, and you can perform the operation well only in young and vigorous shoots near the centre of the head, when such happen to be found.

A Good Orchard.—W. H. Rogers of Orleans County, N. Y., has an orchard of two acres, set in 1820, the crop of which sold in 1865, for $1,800, and it had averaged 400 barrels yearly for 15 years. Hogs have the run, and root in it as they please, to favor which corn has been scattered, and some manure has been applied in addition. In younger orchards Mr. Rogers has 75 Baldwin trees, giving him six barrels three years after planting, and good crops every year since; and 14 trees of Tompkins King gave 11 barrels the sixth year, and an average of 20 barrels yearly since. These young orchards were cultivated and no crop taken.

Profits of Apple Orchards.—This subject was freely discussed at a meeting of the Western New-York Farmers' Club. From the report in the Rural Home, we condense the following estimate of cost and profit:

A. G. Newton said that while the controlling influences of care, culture, locality and insects have much to do with the results, the average figures would be 45 to 70 cents per barrel for picking, packing, handling and hauling, and for the cost of the barrels. An orchard will yield from 50 to

75 barrels per acre under good culture; and one-half, or the best, would sell at $2 per barrel, and $1.50 for second quality. The sales would amount to about $87 to $130 per acre. Deducting the expenses, including moderate manuring, &c., an estimated profit is left of $50 to $95 per acre, at $2 and $1.50 per barrel. But if the sales are only $1 and 75 cents per barrel, the estimated profit is reduced to about $20 per acre. For an orchard bearing only alternate years, the average would be reduced to $45 and $60 per acre one year, and to zero the other.

Thinning Apples.—President Wilder stated, in an address before the Pomological Society, that in the English market American apples of good size, fair, and properly packed, commanded fully double the price of those which had not received that care; and that in our own markets Baldwin apples from a grower who carefully thinned his fruit, brought two or three dollars per barrel, while his neighbors' fruit, from trees not thinned, brought only one dollar.

Spotted Fruit.—The Canadian Horticulturist says truly, that the most effectual remedy for spotted fruit is to avoid planting those varieties which bear it. The following are named as particularly liable: Newtown Pippin, Fall Pippin, Early Harvest, Rambo and Fameuse. Red Canada may be added. Those most free are the Russets, Baldwin, Red Astrachan, Gravenstein, Duchess of Oldenburgh, &c.

Apples for Nebraska.—The Horticultural Society of Nebraska prepared a select list of apples for that State, which may be planted with confidence by those who desire small orchards for home use. If only seven sorts are planted, the Society recommends as summer varieties, Red June and Cooper's Early White. For autumn, Maiden's Blush and Fameuse. For winter, Rawles' Janet, Wine Sap and Ben Davis. If twelve sorts are desired, add the following: Red Astrachan for summer; Rambo for autumn, and the three following for winter: White Winter Pearmain, Domine and Taliman Sweeting. This would doubtless be a good list adapted to all the western regions possessing soil and climate like that of Nebraska.

Culinary Apples.—These should not be wholly overlooked in making selections for planting out. T. T. Lyon of Michigan, who is fully competent to make such a selection, has named the following: Red Astrachan, Duchess of Oldenburgh, Gravenstein, Lowell, Alexander, Keswick Codlin, Rhode-Island Greening.

Hardy Apples.—The Wisconsin Horticultural Society adopted a list of six varieties of the apple, hardiness being the only test. They were Duchess of Oldenburgh, Wealthy, Tetofsky, Haas, Fameuse and Plumb's Cider.

The One Best Apple.—The question was brought up at a meeting of the Michigan Pomological Society, "If all the apples were stricken from the list but one, what would we choose to save for Michigan?" The following answers from different members were the result: The Bald-

win, for all uses—market, dessert, cooking, growth and bearing of the tree; the Northern Spy, for being hardier in tree and better fruit than the Baldwin; the Wagener, because the tree is smaller and bears earlier than the Northern Spy; another member would choose the Rhode-Island Greening. Those present appeared to be nearly equally divided between the first three, the Baldwin rather taking the lead.

Apple Tree Borer.—S. Miller states in the Rural World that in the spring of 1879 he wrapped 30 young apple trees with common newspapers, which extended from a few inches underground to a foot above. In applying this wrapping, the soil was removed from about the base of the stem, and a cord passed around the top of the paper, and half-way down. The replaced soil held the paper at the bottom. At the end of the season the trees were examined and not a borer found in them. A few rods from these trees were others not thus protected, all of which were infested with borers, and some nearly ruined by them.

Codling Moth.—Prof. A. J. Cook recommends that the windows of fruit rooms and cellars where apples have been kept through winter should be covered with wire gauze during the months of May and June, that the moths which have come from the fruit may not escape to the orchards.

Keeping Apples.—B. Hathaway describes, in the Michigan Farmer, his mode of keeping apples. Those which incline to wilt, like the Rus sets, are put in barrels. The more juicy sorts, like the Northern Spy, Greening, &c., are placed in crates, where they will have more air. The apples are stored in an outside cool place till freezing weather approaches, when they go to the cellar. This holds 1,500 bushels, and leaves space for work and passages. The fruit room occupies the whole cellar, which admits of better ventilation than if a portion is partitioned off at one side.

The following rough but good way to keep apples in winter where there is plenty of material, is given in the Practical Farmer, and we quote it for the suggestions it affords: Buckwheat chaff is first spread on the barn floor, and on this chaff the apples are placed, when they are covered with chaff and straw two or three feet in thickness. Here they remain till spring. It is not stated that the interstices are filled with buckwheat chaff, but this care would be important. The covering and bedding in chaff has several important advantages—it excludes cold, prevents air currents, maintains a uniform temperature, absorbs the moisture of decay, and prevents the decay produced by moisture.

Drying Apples.—A report was made to the Ohio Horticultural Society on the Alden process of drying. One of the machines at Adrian, Mich., had cost $10,000, and had paid for itself in five years. It dries 400 bushels of green fruit every 24 hours, and employs 60 hands, mostly girls. The white color of the dried fruit is secured by driving fumes of sulphur through the dryer.

Sending Apples to Europe.—The 1880 report of the committee on this subject to the Massachusetts Horticultural Society, contains some interesting statements. For early shipment, the Gravenstein and Hubbardston Nonesuch do best, and later the Rhode-Island Greening and Baldwin. The first shipments had arrived in the best condition; later, the fruit approached decay, and the second and third shipments had in some instances resulted in loss. The first fruit sent in autumn was Gravenstein, which arrived in fine condition, and brought good prices; and this success induced later shipments of the same sort, which came in a damaged state. The best success with the winter apples was with those which were sent while fresh, early in winter. Of the 200,000 barrels mostly grown in New-England and exported from Boston, the shippers had received a profit of only 4½ cents per barrel. There is no doubt that after understanding the business better, and sending none but the very finest selections, better profits will be obtained.

Pears in California.—According to the California Horticulturist, the varieties for profitable planting have been narrowed down to those for eastern shipment, including Bartlett, Winter Nelis, Doyenne d'Alencon, Easter Beurre and Beurre Clairgeau. For family use, other sorts would of course be planted.

Large and Small Fruits Mixed.—S. D. Willard, two miles west of Geneva, has, besides his extensive nurseries, 18 acres devoted to fruit-raising, planted in 1874, and in six years affording profitable returns. Twelve acres more were planted in 1880. Of the 18 acres, every square rod appears to be well occupied. The larger trees are peaches, pears and plums; between these are currants, raspberries, grapes, gooseberries, &c. The ground is in excellent condition. The young plum trees were loaded with fruit, the jarring process having been employed to destroy the curculio. Reine Claude de Bavay had proved quite profitable, the fruit selling at $3 per bushel; other sorts at $2. The sales from these 18 acres are now between $1,700 and $1,800 in one year. Iu 1880, four tons of currants were sold for nearly $400.

Netting for Gardens.—A writer in the London Garden states that he has a hemp fly-line, which has been in use at least thirty years, perfectly sound and good, which was, when new, steeped in linseed oil, and then stretched and dried in the sun. He also has netting, similarly treated, which has been in use some years. The net should lie in the oil, or in an oily state, for a day or so, and be then wrung out, so as to free it as much as possible from outside oil; afterwards stretched and dried in the sun, several days. Nets are attached to a light frame 4 by 6 feet, by a small galvanized wire running through the meshes all around, the ends being fastened to the wood frame. The wires are placed at intervals of a foot, and the frames, laid on pegs, are used to protect beds of strawberries, currants, and other small fruits.

Strawberry Runners.—A correspondent of the Garden, in describ-

ing his mode of securing early strawberry runners for forcing, states that the layers from forced plants put out early the previous season in good soil, as well as those from autumn planted runners. From these the very earliest runners are selected, and without waiting for them to show leaves, they are pinched beyond the first joint as soon as the joint is visible. The point is immediately layered in good rich compost, and roots are rapidly formed, resulting in plants fit for potting much sooner than by any other method.

Strawberries the Year Round.—The editor of the London Garden, in answer to an inquiry, says that ripe strawberries can be had the year round, and that there is no difficulty about their production every day of the year, only quality must be left out of consideration from October to February, for without sunshine, under the most favorable conditions, the fruit is insipid, and adds that it is hardly worth while to incur great expense for strawberries that are only good to look at.

Raspberries and Blackberries.—The Rural New-Yorker pronounces the Turner as promising to be the best and most valuable early raspberry, and the Cuthbert as the best late sort, and thinks that the Snyder blackberry will be a popular market fruit. We find no other sort to approach it for hardiness, and it is profusely productive. The small size of the berry is a drawback.

Profits of Fruit-Growing.—C. T. Fox, of the Pennsylvania Fruit Growers' Society, states that Christopher Shearer of Berks county, who has several orchards on his hundred-acre farm, realized from them in 1879, the aggregate sum of $12,000. The Berks County Agricultural Society, in its award of premiums, gave him the first premium for orchards, and enumerated in them 2,600 peach, 1,049 apple, 576 pear, 436 plum and 223 cherry trees. Henry Wager received the second premium for his orchard of 3,195 peach, 525 apple, 28 pear, 25 plum and 10 quince trees. He began planting in 1870, and in 1880 had 45 acres in fruit. Sixteen acres of peach orchard were planted in 1869, and in 1874, 1,600 baskets were sold in Reading at an average of $1.60 per basket, amounting to $2,560. In 1875, 3,000 baskets brought $2,550. In 1876, 4,300 baskets sold for $3,225; in 1877, the crop yielded only 300 baskets; in 1878, 1,200 baskets sold for about $1,500, and in 1879 the crop brought $770. The whole amount yielded from the 16 acres in the six years named was 10,750, or $1,790 per annum. We give the amounts for the different years to show that the profits were continuous, and not exceptional. These good returns are rare and are exceptions to the general rule—for the reason that such good management is not common. The owners have studied soil, climate, cultivation, selection of sorts, packing and marketing, or in other words they understand their trade thoroughly. The effect of the $200 and $100 premiums on these orchards, awarded by the agricultural society, was the planting of as many fruit trees in the county in one year as in the ten previous years.

Fruit Crop of the Country.—The annual value of the apple crop of the United States is estimated at $51,000,000, of which Ohio supplies over $7,000,000. The whole peach crop is estimated at $50,000,000, and the pear crop at $15,000,000. The strawberry crop is placed at $5,000,000. Exported canned fruit is estimated at over $1,000,000 annually.

Fruit in Niagara County, N. Y.—This county, it is well known, is one of the best fruit regions in the Union, owing largely to the protection from the severity of north and northwest winds by the open waters of Lake Ontario. The following figures of the amount of the fruit crop in the county in 1879, were given by C. L. Hoag of Lockport, at a meeting of the Western New-York Horticultural Society: The apple crop amounted to 300,000 barrels, which sold at an average of $1.60 per barrel, making $480,000; 120,000 bushels of second class and windfalls, sold for drying at 20 cents per bushel, $24,000; the peach crop, the largest ever known in the county, amounting to over 250,000 bushels, sold at an average of 40 cents, $100,000; 458,000 pounds of cherries brought 3 cents per pound; pears, plums, berries and other fruits made up the entire amount received for fruit to $665,000.

Cultivating Orchards.—J. W. Gray, in his report for Orleans County, N. Y., to the Western New-York Horticultural Society, furnished some interesting facts on the management of orchards. One belonging to S. Bragg, set out in 1862, bore 8 barrels the fifth year, 20 barrels the next year, and after that an average of 85 barrels annually. It was seeded to clover in 1877, and the next year the product fell to 18 barrels. It was next sown with buckwheat, with no improvement. In 1879 it gave 225 barrels, and the owner thinks that in future he shall give it clean culture. Another orchard set the same year with trees from the same nursery, has had grain in it every year, and "the fruit," says Mr. Gray, "has never amounted to anything." An orchard of 100 trees set in 1867 was treated similarly, and bore well until clover was sown on it in 1878, and as a consequence in the fall of 1879 it gave the smallest crop it had ever borne. Mr. B. finds cultivation without manure much better than manured grain crops.

One of the best fruit cultivators in Berrien County, Mich., (on the east shore of Lake Michigan,) says his orchards are not permitted to bear any other crop but the fruit after the third year. The first three years he cultivates hoed crops. He finds the fruit improving both in quantity and quality. He states that no improvements put upon land add so much to the value of farm property for selling purposes, as well cultivated orchards. His peach trees netted one year, above the cost of gathering and marketing, over $400 per accre. So much for good management. It may be objected that such statements are of exceptional cases. This is true, and equally so of exceptional treatment. The best reports of the kind which we can make are of well earned success—either from well selected locality,

properly chosen varieties, good culture and thinning, careful and skillful packing, and a good selection of markets.

We observe in the various reports of the horticultural discussions at the West as well as the most eastern parts of the Union, a nearly universal voice in favor of the clean and thorough cultivation of young orchards for several years after planting. In the more fertile regions, this is followed by seeding to grass and closely grazing after the trees attain good size; in other cases the cultivation is continued. Hoed crops only are allowed. Sheep and swine do much toward the extermination of insects.

At a meeting of the Pennsylvania Fruit Growers' Society, Christopher Shearer, a thorough cultivator, gave in substance, among other items of his practice, the following: He said the high culture or manuring needed for the pear might ruin the cherry. He finds cultivation essential to good orchard fruit. Plant potatoes, cabbages, beets, &c., and avoid grain and grass. Suffer no grass to grow, and destroy weeds. Peach orchards should be plowed, manured, and treated with lime and ashes. He keeps the yellows out by promptly digging up and burning infected trees. He would not run a cultivator under a diseased tree, fearing it might carry the disease to healthy ones. His remedy for the borer is a mixture of three gallons of strong whitewash, two of strong lye, two quarts of clay, and three quarts of cow droppings. The mixture is applied with a whitewash brush from branch to root. The clay and cow droppings in the mixture prevent the lime from cracking open when it dries, and admitting eggs in the crevices.

Leaves and Fruit.—The absolute necessity of leaves in developing fruit is becoming well understood by cultivators, but we still see some blunders committed by those who do not fully understand the office of these organs. The owner of a vineyard concluded he would have better grapes than his neighbors if he turned the full rays of the sun on the forming and ripening bunches. He cut off most of the shoots above the bunches, and thus removed two-thirds of all the fully grown foliage. The consequence was the grapes were nearly worthless, and the vines were ruined. It is the foliage and not the fruit which wants the sunlight. Another instance: A tree of the Yellow Gage plum dropped its leaves from leaf-blight when the plums were only two-thirds grown, and with only a bitter flavor. The branches were quite bare for some weeks, and the fruit was stationary. A new set of leaves then came out, the plums finished their growth and ripened into the honeyed sweetness peculiar to that variety.

Early Bearing Fruits.—Strawberries will come first, an early set bed of which will afford a few the first year, and an abundance the next. Raspberries and gooseberries will bear lightly the second year, and more afterwards. The same may be said of some of the most prolific grapes, as for example, the Hartford. Dwarf pears, of such abundant bearers as

Louise Bonne of Jersey, will begin to give fruit the third year, and so will the peach in favorable localities. The currant should be planted freely; an abundant supply will hang on the bushes a month, improve in quality, and prove of much value. Some sorts of the pear, as Bartlett, Summer Doyenne, Howell, &c., bear much sooner than other sorts. A good supply of tomatoes, melons, &c., should be secured for the first and all subsequent years.

Packing Delicate Fruits.—A writer in the Gardeners' Chronicle gives some good suggestions on the best material for packing delicate or costly fruits for conveyance. He specially recommends dry moss, as having sufficient elasticity, and never heating in masses. A careful use of bran may answer, if packed very tight; but it has a tendency to shrink in bulk when shaken on a journey, and when this is the case, the whole contents may settle, and all the fruit be soon spoiled. Cotton is one of the worst of materials, as it absorbs moisture and becomes wadded together. Small boxes are, of course, better than large ones, as whatever side they are turned upon, a heavy weight is thrown on the lower stratum. The time in the week is important; never send later than Friday morning for a 24-hour transit.

A Good Fruit House.—Judge Sitzel of Reading, Pa., gave a description of a fruit house at a late meeting of the Pennsylvania Fruit-Growers' Society, substantially as follows: It was built with a capacity for 4,000 bushels, and has been in successful use since 1868. It is 50 feet square and 28 feet high, and is built of stone. The fruit room, 8 feet high, is on the first floor, enclosed with a 4-feet space on the four sides, filled with ice from above. The ice-house proper is in the second story, 11 feet high. A foot of sawdust is placed between the ice and outer walls. The floor is water-tight, with pipes to carry the water beneath the building. The third story is to secure ventilation, and has a non-conducting substance above. A space 3 feet deep, below the fruit room, is filled with the surplus ice that remains in the second story, before putting in the fruit in autumn. Four box ventilators a foot square, with valves, lead from the fruit room through the ice-room to the space in the upper story. The fruit is stored in boxes of two bushels each, the bottom of one forming a cover to the one below, and they are placed in tiers, to admit circulation of air and passage. Double doors, lined with hatters' waste wool, afford admittance. The cost was $2,000, and 1,000 tons of ice are required to fill it. The owner has obtained a handsome profit on the investment by keeping fruit. A smaller and cheaper house might be built on a similar plan, but the use of ice will always involve considerable expense.

Zinc Labels.—The horticultural journals occasionally recommend the use of zinc labels for marking the names of trees, the zinc to be written on with a common lead pencil, retaining the name for several years. But the punching and wiring on with copper, which are also recommended,

are quite needless. Cut the strips of zinc half or three-fourths of an inch wide at one end, and half that width at the other, with a length of about five inches, and they may be readily attached to a small branch by winding the narrow end twice around the branch, and nothing more. As the branch grows, the zinc expands by uncoiling, and no harm will be done by cutting into the bark, as is so common with wired labels.

DRIED FRUIT IN ENGLAND.—A writer in the London Garden says that the dried apples and peaches received from America are excellent in quality, and that this mode of disposing of surplus fruit has the advantage of canning in cheapness and in cost of conveyance; and that the drying process is carried on to perfection in America.

CANKER WORM.—The Western New-York Farmers' Club went into a discussion on the best means for eluding or destroying this insect, as reported in the Rural Home, and the following information, although not new, is given for the benefit of those not familiar with its treatment; D. E. Rogers wrapped cheap paper around the trunks early in April, and covered it with common tar. He bought mismatched wall paper for five cents a roll, sawed the rolls in two, and tacked them around the trunks. He thought this cheaper than spraying with Paris green. Mr. Reynolds said the tar hardens, and should be watched and applied again fresh to prevent the worms bridging it. It is necessary to apply Paris green to those worms which escape and ascend the tree. Mr. Reed said pine tar is safe to use, but coal tar sometimes destroys the trees. Mr. Ross said that coal tar might be put on old trees with dry, thick bark, without paper, but on young trees it is certain death. The worms bridge it over in a few days and it must be applied again.

BARK LOUSE.—A practical writer says the best remedy for this insect consists in boiling leaf tobacco in strong lye until reduced to a pulp, and and then mixing enough soft soap to make the whole like thin paint. It is not easily washed off.

TOBACCO FOR THE CURRANT WORM.—The Practical Farmer gives this remedy: Make a strong decoction of tobacco by boiling in a covered vessel. Apply the liquid, when cold, with a watering-pot. Repeat the operation whenever a new crop of the larvæ appears.

ACRID SUBSTANCES AND DEPREDATORS.—Acrid or poisonous substances, which often injure plants when coming in contact with them, may be employed to destroy or repel insects or other depredators. Gas tar, applied with a swab or a pole to caterpillars' nests, kills every caterpillar which it touches. It drives ants away when put in their holes. Mice dislike it when put into their holes. A quantity poured into wasps' nests is an effectual insecticide. The acrid character of gas lime is said to repel the turnip fly, when sprinkled in fine powder over the plants. The codling moth and canker worm can be destroyed by showering the trees with a thin solution of London purple (which mixes better with water than Paris green), the work being done just as the apples are forming.

DOMESTIC ECONOMY.

THE FOLLOWING RECEIPTS, furnished from time to time by numerous correspondents of the COUNTRY GENTLEMAN in all parts of the country, have been carefully selected and condensed for publication in the present form:

HOP AND POTATO YEAST.—Cut up two pounds of pared potatoes, put them in a large saucepan, pour over them three quarts of water, and boil; before the potatoes are sufficiently cooked, add a good heavy half ounce of hops, tied up in a very thin cotton bag, (if hops boil too long, they make the bread very bitter.) In a large kitchen bowl put a pound of sifted flour, two large heaping tablespoonfuls of white sugar, one large heaping tablespoonful of salt, and a tablespoonful of ground ginger. When the potatoes are soft enough to mash through the colander, put the hop bag into a pitcher, and pour over it all the potato and hop water; pour one quart of the *boiling* potato and hop water over the flour, &c., and give it a good mixing; then mash the potatoes through a colander into it, using the second quart of boiling potato and hop water to soften the potatoes through the colander. If you do not have two quarts of potato and hop water, pour some boiling water over the hop bag, and squeeze. The flour must be thoroughly cooked with the boiling hop water, and you must mix it well, and rub it smooth of all lumps. To prevent the yeast chilling too soon, have the big bowl, pitcher and yeast crock heated before using. It should never be thinner than will just pour, but if you think it necessary you can use a little more than the two quarts of hop water; two quarts are generally sufficient. Place the colander over the yeast crock, and strain your yeast into it. Many do not think this necessary, and only mix it in their yeast crock. When a little more than lukewarm, add a large coffeecupful of yeast, stir it frequently, and keep it in a moderately warm place for 24 hours, then put it in the coolest and darkest part of the cellar. Use a two or three gallon earthern crock, (tin, glass or stoneware chill too soon,) with a lid fitting well to the rim.

TO PREVENT FLOUR FROM SOURING.—Take out from the barrel or sack a small quantity of the flour, say 25 or 30 pounds, or a little more if you can conveniently do so, loosen the remaining portion so as to make it quite light in the barrel or sack, and keep in a dry apartment. Compactness and moisture are the only causes of souring.

HOME-MADE BREAD.—A correspondent of the *Deutsche Landwirthschaftliche Press* gives a hint on bread-making. It is well known that dough when well kneaded and of firm consistence gives a whiter and lighter bread than under opposite conditions. But the most important point of all is the previous sifting of the flour through a sieve, so that every portion of it may be brought into contact with the oxygen of the

air. A dough made of sifted meal mixes better with both water and yeast, rises better, and requires far less kneading than when the flour has not been sifted, and the bread obtained from it is ilghter and in every respect of superior quality. The longer flour may have lain aside before being used, the more necessary is it to subject it to the operation.

Bread and Doughnuts.—For two medium loaves use a pint and a half of new milk, two-thirds of a cupful of good potato yeast, and as much flour as can be stirred in with a spoon. This forms the sponge, which, when sufficiently light (usually after standing through the night), must be moulded up as quickly as possible, adding sufficient flour to stiffen, so it can be lifted in the hand and put in the tins; set in a warm place until light, then be baked without further kneading.

For doughnuts, take half the above quantity of sponge and when light, as for bread, add two eggs, one cupful of sugar, half a cupful of lard, half a teaspoonful of salt, and a little grated nutmeg. This is thoroughly mixed by the hands, adding a little more flour, then break off small pieces and mould them until round; lay them on the moulding board (which has been previously sprinkled with flour) when they are left near the fire covered with a cloth for about four hours, and then boiled in the usual way. If boiled quickly they absorb very little fat and when rolled in sugar form a delicious article. If made on bread days, so that a little sponge can be reserved for them, they are made with comparative ease.

Bread from Smutty Wheat—Can be made by using some sour milk whey instead of water, and adding a good-sized potato for every loaf. The whey is obtained by scalding "loppered" milk and removing the curd. No more saleratus is needed than if water is used, while the bread is much whiter and lighter.

Stale Bread.—Take one loaf at a time, as wanted; put it into a steamer well covered, and let it steam for an hour; then put it in the oven (not hot enough to burn it) for about a quarter of an hour, to let the crust become a little dry and crisp. Bread eight days old, treated in this way, has been made as fresh and delicious as the first day it was made.

Brown Bread, Baked.—Take one quart of sifted corn meal and three pints of unsifted rye meal, add one heaping teaspoonful of salt and one small teacupful of good molasses. Mix to a stiff batter with buttermilk, using enough soda to sweeten it. Pour into greased tin pans, and bake in a pretty quick oven till done. You can tell when done by running a broom straw through the loaf. Cover the bread with other tins as tightly as possible. Be careful and not burn. Allow the oven to cool off as the bread gets nearly done.

Brown Bread, Steamed.—Two teacupfuls of sweet milk, two of sour milk, two-thirds of a cupful of molasses, one tablespoonful of soda, and a little salt. Thicken to a soft batter, with half corn meal and half

shorts or Graham flour (shorts are best). Steam three hours in a two-quart pan, and bake 20 or 30 minutes. This is excellent with baked beans.

GRAHAM BREAD.—Take half a cupful of molasses, three cupfuls of sour milk, a little salt, two teaspoonfuls of soda; stir in flour until quite stiff; bake one hour in a moderate oven. This will be found a much quicker way than by using yeast.

CORN BREAD.—One quart of buttermilk, (sour milk can be used, but more butter must be added;) two tablespoonfuls of melted butter; two eggs well beaten; a little salt; one tablespoonful of sugar; one small teaspoonful of salaratus dissolved in a little boiling water, boiled up for a minute or so. Sift the meal, and add enough to make a batter as thick as for buckwheat cakes. Bake in square or round pans about an inch in thickness, for half an hour, in a very hot oven. It is delicious for breakfast or tea, and can be made of yellow or white meal.

CORN PONE.—Take five pints of sifted meal, pour on boiling water sufficient to scald the meal thoroughly; let it stand until almost cold; then add a little salt, one cupful of flour, one-half cupful of molasses, and one cupful of good yeast. Make a rather stiff batter and let it rise. When light it may be too thin; if so, stir in more flour; then place in a deep pan to bake. Do not let it rise again. Bake two hours with a slow fire. This may be eaten warm or cold.

GRAHAM GEMS.—To one pint of flour add one egg, half a teaspoonful of good baking powder, and sufficient thick sweet cream to make a stiff batter. Put into hot muffin or gem rings, and bake in a hot oven. The above receipt will make six gems.

GRAHAM BISCUITS.—To a quart of graham flour add sufficient thick sweet cream to make a stiff dough, beat until light, and bake in a moderately hot oven.

SODA BISCUIT.—Before you begin, make a good hot fire, so that the oven may be just right. It should be hotter than for bread; if they do not bake in a few minutes, they are not good. Despatch in making and baking is as essential to a light, puffy biscuit as is soda or baking powder. Make your biscuits quickly; the sooner they are in the oven after the milk touches the other ingredients, the better they will be. Remember to mix as soft as can possibly be handled, and do not knead them. Handle as little and lightly as you can. In fact, the secret of a good biscuit depends on three things—be quick; roll soft; have the oven just right. The only rule for the quantity of milk is to mix as soft as you can possibly roll it out, or only enough for a very soft dough. Before you begin have your pans ready, also cutter, rolling pin, &c. Sift your flour and measure off one quart; mix dry through the flour two rounded teaspoonfuls of cream tartar; chip up into little bits a piece of butter the size of an egg, also add a pinch of salt. Measure off a teaspoonful of soda (a little smaller spoon than for cream tartar); dissolve it thoroughly in a little

sweet milk or boiling water, so that there may be no possibility of having your biscuit discolored with little yellow specks of soda through them Biscuits require only a few minutes to mix and prepare for the oven after you have got the things together. Put the flour and cream tartar into a bowl; rub in the butter and salt; add the soda; mix with a spoon, adding sweet milk enough for a very soft dough; roll, cut and bake immediately in a very quick oven.

Baking powder biscuits are made in exactly the same manner, only using the powder instead of soda and cream tartar, in the dry flour before wetting.

Tea Biscuit.—Sift four pounds of flour into a large wooden bowl; make a cavity in the centre of the flour, and stir in slowly one pint of lukewarm milk, with half a pint of good yeast, using just enough flour to make the yeast and milk into a batter of the consistency of rich cream. Cover this over and let it stand for two hours; then cut up one pound of good butter into one pint of warm milk, with a little salt; now mix all the ingredients together, work well, dust the top with flour, and let it stand one hour, after which make the dough out into biscuits, about the size of an egg; butter the baking tins and lay the biscuits in rows about three inches apart; place in a warm situation to rise, and as soon as light, bake them to a nice brown, in a hot oven; as soon as they are taken from the oven wash over the tops with a soft brush dipped in milk.

Raised Biscuits without Milk.—Make a dough precisely as you would for raised bread, when well risen stir down and set away until wanted. Then dip a tablespoon into a dish containing soft lard or butter, or a mixture of half lard and half butter (soft, but not melted), and take a bit of dough from the batch into the palm of your hands, and with your fingers manipulate it into a biscuit, dipping your fingers into the dish of shortening as you work, thereby inserting it into the dough in such a manner as to make the biscuit flaky. Place one by one upon a flat baking tin, and set in a very warm place to rise, which will take nearly half an hour. Then bake in a moderately hot oven. You can keep the dough on hand all the time by making up two or three times a week. Keep in as cool a place as convenient without freezing.

Cream Muffins.—Take one cupful of sour cream, a teaspoonful of saleratus, one egg, and flour enough to make a thick batter. Bake in rings on a griddle iron.

Sweet Rusks.—One quart of sweet milk, three tablespoonfuls of yeast, and flour to make a thick batter; let it rise over night, and in the morning add one cupful of lard or butter, (if the former, salt must be used,) rubbed to a paste with one cupful of white sugar, and three eggs, reserving the white of one egg to beat to a froth with a little sugar, and brush over the tops of the rusks when done. Mix with flour to make a stiff dough; make it into small balls; let it rise very light, and bake.

Plain Buns.—One and a half pounds of flour, five ounces of butter,

the same of pounded sugar, and one ounce and a half of German yeast; set a sponge with the yeast, viz.: Mix it with a little tepid water and a little flour, for a quarter of an hour. Then add the sponge to the above mixture, work it smooth with your hand, and replace it in the basin to rise for about two hours; mould them into the form of balls; place on slightly buttered baking sheets; prove them light, and bake off in a sharp oven.

Bath Buns.—Half an ounce of German yeast made into a sponge as for plain buns, half a pound of flour, quarter of a pound of butter; mix the whole lightly together with six yelks of eggs and a little milk. When proved and ready, work in one-quarter of a pound of rough broken loaf sugar; lay them out on a buttered baking sheet in the shape of a rock, put a few comfits on the top of each, and bake in a sharp oven.

Cinnamon Buns.—One cupful of butter, three cupfuls of sugar, four eggs, one cupful of sweet milk, four cupfuls of flour, three teaspoonfuls of baking powder. Bake in two shallow pans, and when baked spread the top with butter, after taking out and placing on a platter; then sift cinnamon and sugar over, while hot, and place the pans they were baked in over them. This steams the cinnamon in and makes them excellent.

Indian Meal Pancakes.—Beat four eggs, add a little milk, and form into a paste with ten spoonfuls of Indian meal; add nearly a pint of milk and one teaspoonful of baking powder; work smooth, and fry, rolling them up with butter, sugar, nutmeg and lemon juice.

Rice Fritters.—Two cupfuls of cold boiled rice, one cupful of sweet milk, three eggs, eight tablespoonfuls of flour, half a teaspoonful of baking powder, and half a teaspoonful of salt. Put two tablespoonfuls of lard into a pan, and when very hot fry the fritters to a nice brown, putting a tablespoonful and a half of batter into each cake.

Buckwheat Cakes.—To have good, wholesome, light buckwheat cakes, you must get the very cleanest and nicest buckwheat—that free from all grit and dirt. Take one-fourth of granulated wheat flour, or one-fourth of oatmeal flour, to three-fourths of buckwheat. Make a batter of these with tepid water and a little salt, using any good lively yeast. Just before baking, add one spoonful or more, according to the quantity made, of molasses, and a small even spoonful of soda or baking powder. The half of a yellow turnip is an excellent thing to rub your griddle with, instead of a piece of pork or any other fat; obviating all the disagreeable odor of the griddle.

Hasty Pudding.—Put three pints of milk to heating in a stew-pan or kettle; then stir smooth in one-half pint of milk, five large spoonfuls of flour, and beat three eggs in another bowl. As soon as the milk boils, (it will heat faster than water,) stir in the batter, having previously added a little nutmeg and salt to taste. If over a brisk fire, it will cook in a moment, and then the eggs should be turned in and stirred briskly half a minute. Remove from the fire and dip into saucers, and before it has

cooled sufficiently to form a scale over the top, grate on a trifle of nutmeg, to improve the appearance. Serve with sugar.

Oatmeal Flour Blanc Mange.—Into one quart of slightly salted boiling milk stir in two and a half large tablespoonfuls of oat flour, adding a piece of butter and a tablespoonful of sugar. Boil for twenty minutes, and turn into a wet mould, or it may be eaten warm. Cream and sugar form the best sauce. This is good for invalids or infants, being light and easy of digestion.

Packing a Pig.—None but an absolutely clean barrel should ever be used. It does not pay to run any risk with pork. A barrel can be continually used if properly cleaned each time, but in no case should a syrup or molasses barrel be taken. It is a custom in the Far West where packages of all kinds are scarce and cooperage high, to clean kerosene barrels by continuous soaking for some months, and they are said when clean to answer the purpose.

The curing of meat is not more uncertain in the hands of a practical farmer than in a great packing-house; indeed, there are many reasons why the farmer has decidedly the advantage. The curing of mess pork, or ordinary salt pork, is simple; but no point must be overlooked, or the result will be either entire loss or a damage to the quality. Except in extraordinary cases, for family use none but clear or nearly clear pork should be salted. After the hog is killed and hung up, split him down the centre of the back-bone; remove the lard; cut off the hams and shoulders; divide the side into two pieces laterally, cutting about midway; cut out the back-bone and spare-ribs to use first, leaving, on the fat portion of the back, as much lean meat as you desire. This part of the back of the hog is all that is suitable for salt pork. Cut it crosswise in strips of equal size; then take each piece and rub it over with fine salt; lay it on a bench on which a layer of fine salt has been spread; pile the pieces in regular order, and sprinkle each layer with fine salt, covering the whole reasonably well.

Let the pork remain a day or two, and the salt will draw all the blood out of the meat. Then rinse each piece; put an inch of salt in the bottom of the barrel; place the pieces of pork with the rind to the side of the cask, making a circle, and so on, circle within circle, compactly and firmly placed, until a layer is finished; on this put enough salt to fill all depressions, and cover an inch deep besides. Continue this process until the work is done, ending with a good layer of salt. Let the meat remain in this condition not less than two weeks (more time will be needed if the meat is in a cold place), and then put a good weight on it, and cover it not less than three inches deep with brine that will float an egg so that a good space on its shell will be out of the brine. If the salt is good, the pork will keep for years, and always be sweet. One can easily destroy the flavor of the whole by allowing small pieces to float around on top. If Turk's Island salt is used, it will be best to make a brine to cover

the meat, instead of water; but in no case neglect the salt as before directed.

The hams, shoulders and flank or belly part (the latter makes the breakfast bacon of commerce) of the hog should be cured in sweet pickle, or rather be made into bacon. For this purpose a syrup or molasses barrel is probably as good as any, and the same rule given before concerning the pork barrel applies as well here; or the same barrel can be used repeatedly as long as kept clean, but never after having been used for any other purpose. For 100 pounds of meat take 4 gallons of water, 6 pounds of best salt, $2\frac{1}{2}$ ounces of saltpetre, and $1\frac{1}{2}$ pounds of New-Orleans sugar, or its equivalent in molasses. Boil and skim, and apply when cold. It is quite as well to draw the blood from the meat by a day or two of dry salting, as described for salt pork, but as meat should never be kept in this pickle long in hot weather, this is not essential. Keep the meat in this pickle for at least four weeks, and if the pork is heavy, at least six weeks, deducting any time that the package has been frozen, or in a place where it was as low as freezing point. Then dry and smoke to suit taste. Wrap each piece carefully in paper, enclose it in a muslin bag, and hang in a dry, cool place.

Curing Hams.—To six gallons of water, add nine pounds of salt—half coarse, half fine—three ounces of saltpetre, three pounds of brown sugar, one pint of molasses, one heaping tablespoonful of saleratus. Boil all together, and skim. Let it stand till cold, then pour over the hams, which have been rubbed with a little fine salt, and packed in a barrel. Let them lie in the brine five or six weeks, after which drain and smoke.

The same preparation is used for pickling beef. A pork barrel will answer for pickling beef, but after being once used for this purpose, must never again be employed as a pork barrel. Many losses occur from ignorance of this fact.

A Dry Pickle.—Those who have only a few hams to cure, or lack barrels for holding brine, will find the following method nearly as good as the other: For 150 pounds of meat, take $1\frac{1}{2}$ ounces of saltpetre, four quarts of fine salt, with enough molasses to make a paste. Rub well with this mixture on the flesh side; let the hams lie four weeks; then smoke two days. Remove from the smoke-house, and paint with black pepper and strong vinegar.

Keeping Hams.—Make bags of double paper (newspaper, or use singly the heavy brown paper flour sacks), making them large and loose for the ham; tie them, a little above the meat, very securely and tightly around the strings or hooks by which they are suspended. Instead of strings, if practicable, have old-fashioned pot-hooks, eight inches long or thereabouts, made of small, round iron, or very heavy wire. These are always ready, and if carefully cared for, may last a hundred years. For this way of keeping smoked meat, a dry place, free from rats and mice, is requisite. In a damp place, mould will gather; and in a hot attic, while

the meat will keep perfectly sweet, it is apt to get too hard for convenience of cutting. Double paper will keep out insects if no holes are allowed. Similar bags are excellent for dried fruit.

HAMPSHIRE BACON.—Procure a shallow, wide tub; any clean tub will do, but a wide one, in many respects, is best. For convenience the tub should not be more than half as deep as an ordinary sized pork barrel—a molasses barrel cut down is one of the best and cheapest, but a little narrow. Make a brine strong enough to well buoy up an egg. To each peck of salt add two ounces of salts of prunella (refined saltpetre) and from one to two pounds of brown sugar, or the same quantity of good molasses. The sweetness is to be regulated according to the taste of those who are to eat the pork or bacon. Allow the meat to remain in the pickle about six weeks or so; then if dried bacon is required, take out and let it drip. Then if you wish for smoked bacon, smoke in the ordinary way, using clean, dry corn cobs. If you do not wish it to be smoked, hang in any warm, dry place you please. When dry (if not smoked), rub all over with dry wheat flour, wrap in old newspaper or cloth when dry enough, and put in an airy, dry place. Instead of scalding a bacon hog in Wiltshire and Hampshire, they roll the dead hog in a lot of clean, dry straw, and burn off all the hair or bristles. The meat can remain in the pickle, if so desired, and be used from the barrel as in ordinary pork, care being taken not to allow the brine to sour. Taste occasionally, and if any change is noticeable, take out the meat, boil and skim the brine, and when quite cold, replace the meat.

MUTTON HAMS.—Take the hind or fore legs of a sheep, and rub them with the following: Mix two tablespoonfuls of sugar with the same quantity of table salt, and half a tablespoonful of saltpetre. Place the hams in separate pans, and rub each one with the same quantity. Turn twice a day for three days, and rub thoroughly with the hand at each time, turning away the liquor which flows from the meat. Then make a a new mixture, and turn and rub daily for ten days. At each rubbing take care to leave that side uppermost which was under before. Then smoke the hams like those made from pork, and boil in the same way.

HAMBURG PICKLE.—Take one gallon of boiling water, one pound of common salt, one and a half pounds of brown sugar, and two tablespoonfuls of saltpetre. Add to this half a pint of vinegar. Simmer until all the ingredients are dissolved. Pour over the meat boiling hot. In two or three hours it will be ready to smoke.

FRIED PORK.—Slice the pork a trifle over half an inch thick; put it into cold water to freshen. Before the water is scalding hot (set it, of course, on the top of the stove, in the spider or frying pan, to heat) take the slices of pork out to drain, empty the water out, and set the pan back on the stove. When it is dry, spread your pork around on the bottom, and let it fry slowly Take a fresh laid egg, and beat it lightly in a pint

dish, add a teacupful of sweet milk, and stir in flour to make a stiff batter, beat it well; no salt or soda to be used. Turn the pork over so both sides will be a light brown. With a fork dip the slices separately into the batter, and lay it back in the hot gravy; turn the slices over, so that each piece will be cooked; then lay them on the platter, and what batter remains drop into the pan and fry like griddle cakes. When cooked, lay upon the platter with the pork; turn the gravy or lard that remains, on the side of the platter, not over the top of the batter, and serve hot. No one will ever speak slightingly of fried salt pork after eating it cooked in this manner.

Another good way to fry pork is to freshen it in the same manner, and then roll the slices in sifted corn meal, being particular to cover the entire surface of each slice with the meal. Put it in the frying pan, and let it cook slowly, turning it occasionally, till the whole surface is a bright golden brown.

Boiled Corn Beef.—This is much improved if cooked in plenty of water, and when thoroughly done, left until cold in the same water that it was boiled in. Lift the pot off the fire, and let pot, water and meat grow cold together. This will make it much more moist and juicy, besides tender and sweet, than if taken out hot, and all the moisture in it dried out by standing and steaming until it grows cold. Hams, tongues, &c., should be cooked in the same way.

Sausage.—A good way to cook sausages is to boil them first in water in a frying pan; then encasing them in a covering of plain pie-crust, bake them until they are done. You may make a gravy, if you like, out of the water they were boiled in, adding browned flour, a small piece of butter, and a little summer savory.

Veal Sausage.—Chop small equal parts of veal and salt pork. Season with pepper and sweet herbs, mixing all well together with the meat; tie in a cloth and hang it in a cool, dry place. When about to use it make the sausage into cakes, flour them, and fry in hot lard.

Leberwurst.—Too often this is made with liver as the principal ingredient, which gives it a dry, woody taste. The aim must be to get together a variety of swine meat, and add only sufficient liver to flavor the mass. Put tongue, heart and some fat loin pieces, and about a fourth part of liver, into a pot, and boil slowly till done tender. Cut in smallish pieces, so as to show distinctly in the mass, avoiding fine hashing, except the liver, which reduce to a fine pulpy consistence. Season lightly with pepper and salt and mix well, stirring carefully—the whole operation to be done as soon after the pot is removed from the fire as the hands will bear the heat. Then set away to cool. Warm well as wanted for the table and add a little seasoning if desired. It is excellent only when fresh, and should be kept in a cool place. Baked sour apples taste well with it. Some prefer raw sliced apple warmed up with it; this requires more heat and longer time, crisping the mass a little where

it comes in contact with the griddle. It makes the wurst more palatable when age has detracted from its quality.

Calf's Head Cheese.—Boil a calf's head in enough cold water to cover it, after you have let it lie in clean hot water to soak for an hour. Add salt; this will send the scum to the top of the water, which must be taken as fast as it rises. Let it boil gently until done, or until the meat leaves the bone, when take it up, dividing the meat from the bone. Season with salt, pepper and sweet herbs, and a little grated nutmeg if liked. Place in a deep dish or basin, putting a plate and a gentle weight over the top of it. When cold it will be nice sliced for supper, or sandwiches.

Jellied Calf's Head and Ham.—Chop the meat when it has been boiled until it will slip from the bones; season with pepper, salt, allspice and the juice of lemon. Chop half as much raw ham, fat and lean; butter a bowl; line it with slices of hard-boiled egg and fill with layers of calf's head and ham alternately, moistening each layer with a little of the liquor from the calf's head; fill nearly to the top; then pour in all the liquor that will soak in; cover with a paste of flour and water stiff enough to mould, and bake in a hot oven one hour and a half; remove the paste when the dish is cold, and serve in thin slices. It must be made the day before it is used.

Jellied Veal.—Cut a knuckle of veal into three pieces; place it in boiling water and keep on the simmer until the bones will slip out; chop the meat fine and strain the liquor in which it was boiled; then season it with salt, pepper, allspice and onions chopped fine, and boil it again until there is not much over a pint. Place the chopped meat in a mould; turn the liquor over it; let it stand over night and serve in thin slices, garnished with sliced hard-boiled eggs and bits of parsley. The juice of a lemon will improve the jelly, and the peel can be grated into the meat for a seasoning, which will be preferred to the allspice by many persons.

Pressed Veal.—Take eight pounds of veal; hash the meat; three eggs beaten, pepper and salt, and nutmeg to taste; add three tablespoonfuls of butter melted. Roll eight crackers; mix half with the meat; the other half to be put on the outside. After making the meat in a form, bake two or three hours, basting with butter. Half fill the pan in which the loaf is baked, with water when it is placed in the oven.

Roulade of Beef.—Have the butcher cut you a round steak, one inch thick, which you must again cut with a very sharp knife into four thinner slices. Divide one pound of sausage meat into four parts. Roll each part in one slice of the beef, and tie it tight with thread to prevent the sausage meat from coming out. When your rolls, or roulades, are made, put on the fire a small porcelain lined kettle in which is a small piece of butter, four slices of pork, two carrots and two onions. When the butter is melted, put in the roulades and let them brown, then add

boiling water to hardly cover them; salt, pepper, one clove, and parsley if you have it. Let the whole cook slowly for three hours. Before you dish, take the fat off the gravy, and add a teaspoonful of dissolved corn starch to thicken it. If there is not enough gravy, add a little more water and let it boil up. This is an economical and delicious dish.

Broiled Sweetbread.—Parboil and rub well with butter; then split open the sweetbreads and broil them on a gridiron, putting them every three or four minutes into melted butter, so as to baste them well; season with salt and pepper; when well browned, serve very hot.

Baked Chicken Pie.—Line a deep dish with a moderately thick paste. Having cut up your chickens, and seasoned them to your taste with salt, pepper and (if you like it) mace and a little grated nutmeg, put some pieces of cold ham between the chicken, and if you have some oysters you will find them a great addition to your pie; also a few yelks of hard boiled eggs. Fill the dish two-thirds full of cold water and pieces of butter rolled in flour. Put the top crust on, cutting a hole in the centre of it. Cut out of the paste some handsomely shaped leaves, which you must lay around the edge of your pie. You may also form a rose to lay in the centre.

Chicken Fricassee.—Cut up the chickens and wash well in salt water; put them in a pot, with enough cold water to cover them; add (for two chickens) half a pound of salt pork, cut up in thin strips; cover, and let heat very slowly, then stew until the fowls are tender. Cook slowly; if they cook fast, they toughen and shrink. When almost done, add, if desired, a chopped onion or two, some parsley and pepper; cover again, and, when it has heated to boiling, stir in slowly a teacupful of milk, containing two beaten eggs and two teaspoonfuls of flour; boil up again, and add one tablespoonful of good butter. Arrange the chicken nicely in a deep dish, pour the gravy over and serve hot.

Fried Chicken.—Have some lard very hot; sprinkle the pieces of chicken well with flour; put them in and cover tightly for a while; cook as fast as possible without burning, After a little while take off the lid; season with salt and pepper, and if brown, turn the pieces and brown again as fast as possible. We think the meat is more tender and much more juicy than if allowed a long time over a slow fire.

Cream Pastry.—To a quart bowl of sour cream, add one and one-half small teaspoonfuls of saleratus or cooking soda, dissolved in two tablespoonfuls of boiling water, and allowed to boil up for a minute or two. Beat it into the cream, and as soon as it foams, stir in one quart of flour that has just been sifted. Add enough sifted flour to roll out very soft. Be very careful not to mix it up stiff, but put in only enough flour to keep it from sticking to the fingers and rolling pin. If richer pastry is desired, bits of butter or lard can be rolled into the paste.